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TABLE OF CONTENTS

	PAGE
Statistics*	479
Breeding*	481
Genetics*	482
Variations, Modifications, Mutations	485
Adaptation	490
Evolution	490
Cytology*	492
Microscopic Technique	498
Botany*	498
Agriculture	498
Diseases, Injuries, Bacteria, Fungi, Viruses*	499
Insecticides	509
Crop Plants	509
Cereals	530
Wheat	531
Buckwheat	542
Oats	542
Rye	543
Maize	545
Barley	552
Millets and Sorghums	558
Rice	559
Forage Grasses	561
Leguminous Forage Plants	568
Roots and Tubers	573
Fibres	579
Sugar and Starch Plants	587
Stimulants	590
Minor Crop Plants	596
Fruits and Nuts	600
Forestry	609
Vegetables	612
Book Reviews	624
New Journal	635

Note.—Initialed reviews are written by the following:—

Dr. G. E. Fogg	G. E. F.
Dr. S. D. Garrett	S. D. G.
Dr. J. Wishart	J. W.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XXII, No. 4

*STATISTICS

2360 FISHER, R. A.
Statistical methods in genetics.
Heredity 1952 : **6** : 1–12.

A general survey is given of the development of statistical aspects of genetical research. In examining the nature of genetics from the point of view of a statistician, the consolidating influence of Bateson is discussed, with reference to his emphasis on three aspects of Mendel's work: "to determine the number of different forms under which the offspring of hybrids appear, or to arrange these forms with certainty according to their separate generations, or definitely to ascertain their statistical relations." Special attention is given to the relationship between the mode of gamete formation and variation in the resulting genotypes, with respect to disomic and polysomic inheritance.

2361 MARTIN, L.
Probits normaux classiques et probits relatifs à la répartition triangulaire. **(Normal classical probits and relative probits with triangular distribution).**
Bull. Inst. Agron. Gembloux 1951 ; **19** : 364–86.

It is suggested that the normal distribution, which is the basis of the usual probit technique, might, on occasions, be replaced by a triangular distribution. The consequences of this replacement are worked out and comparison is made with other distributions that have been considered elsewhere.

2362 TEGHEM, J.
Ajustement d'une équation linéaire à une série chronologique périodiquement lacunaire. **(Adjustment of a linear equation to a chronological series with periodic gaps).**
Bull. Inst. Agron. Gembloux 1951 : **19** : 390–94.

A formula is given for the linear regression coefficient when the values of the independent variable are equally spaced but with missing values which are themselves equally spaced; as, for example, daily readings with the Sunday observations omitted.

2363 STEVENS, W. L.
Asymptotic regression.
Biometrics 1951 : **7** : 247–67.

The regression equation

$$y = \alpha + \beta\rho^x,$$

where α, β and ρ are unknown parameters and observations are made on x and y, is tedious to fit by the usual maximum likelihood methods because the information matrix is so laborious to calculate. The author remarks however that effectively this matrix depends only on ρ and he gives tables which yield the elements in the matrix when the values of x are equally spaced, of equal accuracy and either five, six or seven in number. The usual iterative procedure for the solution of the maximum likelihood equations is then comparatively straightforward. Two practical examples, one of a fertilizer trial, are given in detail. There is a discussion on the effects of a preliminary grouping of the x values.

2364 BAILEY, N. T. J.
Testing the solubility of maximum likelihood equations in the routine application of scoring methods.
Biometrics 1951 : **7** : 268–74.

The only distributions considered are of the multinomial type so that the scores are linear functions of the observations. In this case the author remarks that the equations should be tested for solubility before carrying out the computations. In particular, if the number of degrees of freedom equals the number of parameters to be estimated the solution to the equations is obtained by equating the observed values to their expectations.

2365 **Recent advances in mathematical statistics. Bibliography 1943-47.**
J.R. Statist. Soc. (A.) 1951 : **114** : 497–58.

This bibliography covers papers, published during the years 1943–47, which deal with the development of some aspect of statistical

* General studies, see also individual crops.

theory, or the application of statistical method to practical problems. It lists over 2000 papers under sections which include applications to biology, agriculture, forestry and genetics.

2366 Cox, D. R.
Some systematic experimental designs.
Biometrika 1951 : **38** : 312–23.

Consider an experiment to compare a number of treatments on plots arranged in order in space or time, one treatment being applied to each plot. Assume that the measured quantity may be represented by

(Treatment constant) + (Smooth trend) + (Random quantity),

where the random quantity has zero mean, constant variance and is independent in different plots. The problem considered is how to arrange the treatments to give simple and accurate estimates of the treatment differences when something is known about the nature of the trend. Several methods for the solution of this problem are known. The author considers the case where the trend can be represented by a polynomial of degree p, p being known *a priori*, and shows that there are certain designs for which the treatment differences are either exactly, or to a good approximation, orthogonal to the trend. The efficiency of these designs is shown to be high in comparison with randomized designs. Several examples are given.

2367 David, H. A.
Further applications of range to the analysis of variance.
Biometrika 1951 : **38** : 393–409.

The methods of Hartley are extended to cover a number of additional orthogonal designs including: (*a*) a double classification with cell replication; (*b*) a double classification with two-factor treatment combinations; and (*c*) the split-plot experiment. A procedure for the general three-way cross-classification is indicated and approximate methods to deal with a simple classification with unequal cell frequencies are also considered. An example is given of each of the main cases and the necessary tables are provided. Both the systematic and random probability models are included.

2368 Hartley, H. O.
The fitting of polynomials to equidistant data with missing values.
Biometrika 1951 : **38** : 410–13.

A variant of the missing-plot technique is used to deal with the situation described in the title. There is considerable saving in computational labour since use of the orthogonal polynomials can be continued.

2369 Box, G. E. P. and Wilson, K. B.
On the experimental attainment of optimum conditions.
J.R. Statist. Soc. (B.) 1951 : **13** : 1–45.

The general problem is considered of finding experimentally the levels of a number of quantitative variables at which some dependent response has a maximum value. Ideally this could be done by covering the whole of the region of possible values of the variables with a network and carrying out an experiment to determine the response at each point of the network. It is obviously more economical to begin at some point in the region, carry out some preliminary experiments in its neighbourhood and to determine what seems to be the best direction in which to continue experimentation. If the experimental error is small this will often lead to the maximum value of the response. The authors discuss possible designs when the errors are appreciable, but not too large, and consider the accuracy with which the optimum point is determined.

2370 Clarke, P. M.
An analysis of rectangular lattices with unequal block sizes, using interblock information.
Biometrics 1951 : **7** : 287–94.

The paper extends the analysis of two dimensional p x q lattice designs, with blocks of unequal size, to recover interblock information when $(q - p)$ is neither greater than five nor greater than 10% of pq.

2371 Greenberg, B. G.
Why randomize?
Biometrics 1951 : **7** : 309–22.

The author is concerned chiefly with medical experiments, but the paper serves to illustrate the advantages of the randomized over the systematic design.

2372 Hamy, M. A.
Sur une nouvelle méthode d'expérimentation. **(On a new experimental method).**
CR Acad. Agric. Fr. 1952 : **39** : 299–300.

A method of conducting varietal trials is described in which long narrow strips are used and values are compared according to their location along the strips.

2373 HAMMING, G.
Interactie-problemen. **(Problems of interaction).**
Landbouwk. Tijdschr., Wageningen 1952: **64** : 162–73.

The treatment of missing plot data proposed by the author in an earlier paper (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 105) is extended and applied to variety trials extending over a period of years in which there are many missing plots. The universe so constituted is described as heterogeneous and the requisite weighings are presented in tables.

2374 CONAGIN, A.
Disposição sistemática dos canteiros—sua influência sôbre a estimativa do êrro experimental. **(Systematic plot arrangements, their influence on the estimation of experimental error).**
Bragantia, S. Paulo 1950 : **10** : 203–07.

Uniformity tests with plots of Pusa 4 wheat showed that Latin square arrangements were more efficient in eliminating error due to soil variation than systematic designs.

2375 HEALY, M. J. R.
Latin rectangle designs for 2^n factorial experiments on 32 plots.
J. Agric. Sci. 1951 : **41** : 315–16.

Data from a sugar beet uniformity trial analysed in different ways by Yates (cf. *Plant Breeding Abstracts*, Vol. VIII, p. 304) have again been analysed, superimposing a partially confounded design for five factors. Designs are given for factorial experiments with three, four or five factors, each at two levels, using 32 plots in a 4 x 8 pattern. The effects of both rows and columns can be eliminated from the estimate of error. Provided interactions of three or more factors are assumed negligible, information can be retained on all interactions between two factors.

2376 ALLARD, R. W.
The precision of lattice designs with a small number of entries in Lima bean yield trials.
Agron. J. 1952 : **44** : 200–02.

Using data on the dry seed yields of 25 small scale variety trials of Lima beans, carried out over four years in California, a comparison was made between the relative efficiency of lattice designs and complete randomized blocks. The mean gain in precision resulting from the use of lattice designs was only 14%. It is therefore suggested that in small field experiments the more practicable randomized block designs should be used.

*BREEDING

2377 MINKEVIČ, I.
(Some results and objectives of the research work at the scientific research institutes).
Socialističeskoe Seljskoe Hozjaĭstvo (Socialistic Agriculture) 1952 : No. **3** : 11–21. [Russian].

Cereals. Productive wheats developed in recent years include the spring varieties Moskovka [Moscow], Albidum 3700, Artemovka and Narodnaja [People], the latter a *Triticum durum* variety, and the winter wheats Odesskaja 3 [Odessa 3], Odesskaja 12, Stepnaja 135 [Steppe 135], Uljjanovka [Uljjanov], Alabasskaja, Skorospelka L–1 [Early L–1] and Ljgovskaja 873 [Ljgov 873]. The last named variety does well upon irrigated fields.
Of the new varieties of rye, Volžanka [Volga], bred at the Institute of Agriculture of the Southeast of the USSR, is remarkable for its hardiness and resistance to drought.
Sugar beet. Productive varieties with a high sugar content bred at the Ramonj Breeding Research Station include R 407 and R 632.
Oil plants. A new variety of castor, G–165/1100, producing indehiscent capsules, has been developed. It is suitable for mechanical harvesting. The most recently developed varieties of sunflower include Saratovskiĭ 10 [Saratov 10], which is productive and has a high oil content, and 8883 and 8932, which are early and show resistance to *Orobanche*.

2378 OGNEV, I. M.
(The best standard varieties for the collective and state farms of the BSSR).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. **1** : 48–52. [Russian].

Several varieties of cereals, leguminous forage plants and peas and beans grown for seed, which have been recently made standards in White Russia are listed.
Wheat. Moskovskaja 2453 [Moscow 2453] is more productive on some soils than the standard Lutescens 1866. The latter is a productive hardy mid-season variety with good baking and milling properties. Unfortunately it is susceptible to lodging and shedding. It was bred at the White Russian State Breeding Station.

* General studies, see also individual crops.

Erythrospermum 917, bred at the Harjkov State Breeding Station, and Vysokolitovskaja Mestnaja [Local Tall Lithuanian] and Danjkovskaja Granjatka show resistance to lodging and the two former also to shedding.

The new spring standards include Fylgia, which shows resistance to lodging and spring frost and does well on peat soils, and Ledovka Mestnaja [Local Ice], which is adapted to the local climatic conditions.

Buckwheat. Terehovskaja Mestnaja [Local Terehovskaja], Mestnaja Bobruiskaja [Local Bobruĭsk] and Mestnaja Mozyrskaja [Local Mozyr] are large-grained, productive and early, and show resistance to lodging. They were bred in White Russia.

Oat. Besides the standards Sovetskiĭ [Soviet] and Zolotoĭ Doždj [Golden Rain], Moskovskiĭ 315 [Moscow 315] has been certified as admissible in several provinces of White Russia, and Belyĭ Mazur [White Mazurian] and Antoninskiĭ Želtyĭ [Yellow Antonin] in one province each.

Rye. Novozybkovskaja 4, an early and hardy variety outyields, on some soils, the other varieties, including Vjatka. Partizanskaja Mestnaja [Local Partisan] is productive, has large grain and shows resistance to lodging. Benjakonskaja shows resistance to shedding and outyields Vjatka and Novozybkovskaja 4.

Millet. Podoljanskoe 24/273 is productive and shows resistance to frost and shedding. On some soils it is outyielded by the early standard Hoĭnikskoe Mestnoe [Local Hoĭnikskoe], which shows resistance to lodging but is susceptible to shedding. Dolinskoe 86 shows resistance to lodging. Its yielding capacity may be high in some seasons.

Clover. The best local single hay and two hay clovers have been made standards in several provinces.

Lupin. Belosemjannyĭ [White-seeded], remarkable for its capacity for rapid recovery from drought effects, has been made a standard forage lupin, while Rozovyĭ 399 [Pink 399] and Benjakonskiĭ 484 are recommended for ploughing in. All three standards produce mature seed.

Vicia. Ljgovskaja 31–292 [Ljgov 31–292] and Komaričskaja Mestnaja [Local Komaričskaja] produce good yields of mature seed. Both standards show susceptibility to lodging and shedding.

Phaseolus. Belorusskaja 288 [White Russian 288] has been bred at the White Russian State Breeding Station. It is a productive mid-season variety showing resistance to fungous diseases and lodging. The seed is medium large and has good flavour.

Pea. Zazerskiĭ, bred at the White Russian State Breeding Station, and Torsdag have been recently added to existing standards. Zazerskiĭ, a productive mid-season variety, with medium large seed, shows resistance to shedding.

*GENETICS

2379 MANTON, S. M.
Developments and science in the Soviet Union.
Nature, Lond. 1952 : **169** : 729–32.

The text is given of a lecture delivered to the Linnean Society of London, describing a recent visit of the author to the Soviet Union. Some reference to crop breeding is included. One of the plots seen by the author contained branched wheats which bore tillers ending in an ear of rye; each of such plants had been raised from a single wheat seed. Some wheat ears showed isolated grains of rye. M. A. Olshansky [M. A. Oljšanskiĭ] explained that rye seeds produced on wheat gave only rye plants, with a chromosome number of $2n = 14$.

2380 NACHTSHEIM, H.
The Soviet violation of biology.
J. Hered. 1952 : **43** : 19–21.

Comments are made on the following: a recent article by A. N. Studitski [A. N. Studickiĭ] entitled "The Science of Development from Lamarck to Lysenko," which was recently published in the Soviet Zone of Germany; a film called "The Great Force," depicting poultry breeding according to the system of Lysenko; and Lysenko's support for the work of Lepešinskaja on the origin of cells and on the transformation of species.

2381 GLUSHCHENKO, E.
Correction of a correction. Reply to Dr. Albert Levan and Professor Arne Müntzing.
Hereditas, Lund 1952 : **38** : 370–76. (Abst.).

LEVAN, A. and MÜNTZING, A.
Comments on Professor Glushchenko's "Correction of a correction."
Hereditas, Lund 1952 : **38** : 377–84. (Abst.).

Glushchenko [Gluščenko] defends his impressions of the Seventh International Botanical Congress, and continues along familiar lines his criticism

* General studies, see also individual crops.

of Mendelian genetics and the results of its practical application (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2302). He gives fresh arguments in support of his opinion that the X-ray-induced mutants of barley and colchicine-induced tetraploids of rye and clover on view at Svalöf are of doubtful practical value. In their reply to Gluščenko's comments, Levan and Müntzing reject the view that these forms possess no real value, by citing pertinent information on their performance. They express scepticism concerning Lysenko's claims of the sudden transformation of cereal species and point to the role of weed species in the contamination of cultivated crops.

2382 PORTÈRES, R.
Compétition ou entr'aide au sein de l'espèce et de la race. Le cas des germinations de *Cinchona*. (Competition or mutual aid within the species and race. The case of *Cinchona* germinations).
CR Acad. Sci. Paris 1948 : **227** : 1114–15.

Cinchona seedlings sown at a density of 0·5–1·0 grm. per m.^{2} had a germination percentage of 80–85%, but after thinning out, no more seeds germinated. At a density of 4–6 grm. per m.^{2}, the germination percentage was 50–55%, but on thinning, more seeds germinated, and this process continued with successive thinnings. These observations are regarded as supporting the view, attributed to Soviet biologists, of mutual aid and lack of competition within species, but this conclusion is believed to apply to Jordanian rather than to Linnean species.

2383 DARLINGTON, C. D.
The coming of heredity.
Discovery 1952 : **13** : 139–43.

A popular account is given of pre-Mendelian concepts of inheritance and the development of genetical theories during the present century.

2384 STOUT, A. B.
Reproduction in *Petunia*.
Mem. Torrey Bot. Cl. 1952 : **20** : No. 3 : Pp. 202.

New data on the genic mechanism of unilateral hybridization and its role in speciation and biosystematics, resulting from a study of three species of *Petunia*, are presented in detail. The interaction of genetic components controlling unilateral sterility and intraspecific incompatibility, and their effect on somatic differentiation of male and female tissues in hermaphrodites are among the topics discussed.

2385 LAUGHNAN, J. R.
On the designation of closely linked genes with similar effects.
Amer. Nat. 1952 : **86** : 109–11.

It is pointed out that the term pseudoallelism was originally applied to an apparently allelic relation between genes having greatly different phenotypic effects and probably a fortuitous proximity due to some special chromosomal alteration. This special kind of position effect has only been detected in *Drosophila*. The term is not regarded as being strictly applicable to closely linked genes which have similar phenotypic effects and probably have their origin in duplication. The term paraallelic is proposed for closely linked genes of this type.

2386 SÁNCHEZ-MONGE, E.
The estimation of linkage with incomplete penetrance.
Heredity 1952 : **6** : 121–25.

Formulae are given for the estimation of linkage between two genes, one of which has incomplete penetrance, from back cross and intercross data.

2387 HAGBERG, A.
Heterosis in F_1 combinations in *Galeopsis*. I. and II.
Hereditas, Lund 1952 : **38** : 33–82; 221–45.

Data are presented on variation in the F_1 of 81 crosses between pure lines of *G. speciosa*, *G. pubescens*, *G. Tetrahit* and *G. bifida*. Variability among heterozygotes in such characters as size of stomata, size of pollen grains, plant height, dry weight and time of flowering is compared with variation between the corresponding homozygous parental lines.

From the observations made it is suggested that heterosis is only to be expected in characters which have or have had a positive selective value; whereas extreme earliness or lateness of flowering might be selectively disadvantageous, superior height and dry weight have an obvious selective advantage.

The degree of heterosis was on an average higher in allotetraploid species than in diploids.

2388 MELVILLE, R.
Co-existence of positive and negative heterosis in a single plant organ.
Nature, Lond. 1952 : **169** : 1054–55.

Mean leaf shape was investigated in *Ribes sanguineum*, *R. odoratum* and their hybrid *R. Gordonianum*. The leaves of the hybrid showed negative heterosis for the measurements from tip to tip of the main basal lobes and from the

leaf base to the tips of the main basal lobes, but positive heterosis for breadth of the subterminal lobes. Leaf shape in *R. Gordonianum* appears to depend upon the interaction between dominant or subdominant genes contributed by both parents, with growth in length under the control of genes from *R. odoratum* and general shape probably determined by genes from *R. sanguineum*. The latter species probably also contributes subdominant genes for absolute size of leaf. Growth of the leaf was allometric, at least in the final stages. The author puts forward the following theory of heterosis. When length and breadth of an organ are differentially controlled, differences in linear dimensions will be logarithmically increased by further growth in comparison with the dimensions of one of the parents. If overall size is controlled in the hybrid mainly by genes from the larger parent, positive heterosis results. If, on the other hand, control of size is inherited from the smaller parent, negative heterosis may occur, or the hybrid may attain an intermediate size. Regardless of which parent determines overall size of an organ, actual size depends upon the stage reached in the allometric growth series.

2389 ERNST, A.
"Maternal hybrids" nach interspezifischen Bestäubungen in der Gattung *Primula*. 2. Sektion *Farinosae*. ("Maternal hybrids" after interspecific pollination in the genus *Primula*. 2. Section *Farinosae*).
Arch. Klaus-Stift. VererbForsch. 1951 : **26** : 187–322.

In the present paper the results from hybridization experiments between diploid dimorphic species and a monomorphic tetraploid plant of the section *Farinosae* are used in comparing the fertility relationships of the monomorphic *P. longiflora* with the results from legitimate and illegitimate intraspecific pollinations of long and short styled plants of the two dimorphic species *P. farinosa* and *P. rosea*. Then, the results from interspecific pollinations between these diploid dimorphic species and the tetraploid monomorphic *P. longiflora* are described. Finally an analysis is made of the maternal hybrids from pollinations of *P. longiflora* and of their progeny. In general the results obtained throw light on the phenomena of intraspecific and interspecific compatibility and incompatibility and also provide numerical data for calculating approximate values of the frequency of maternal hybrids after interspecific pollinations.

The possibility of the occurrence in angiosperms of matromorphic and patromorphic hybrids, their fertility and progeny are discussed generally, and also more particularly in relation to interspecific crosses of *Primula*, *Solanum* and *Digitalis*.
Finally, the author puts forward the view that the maternal hybrids of the genus *Primula* are to be considered as resulting from parthenogenesis induced by hybridization in otherwise normally amphimictic species (cf. Absts. 74 and 896).

2390 ROBERTSON, A.
The effect of inbreeding on the variation due to recessive genes.
Genetics 1952 : **37** : 189–207.

A theoretical consideration of the effect of inbreeding on the variation due to genes which are completely recessive deals with a case of continued full-sib mating and lines of constant breeding size. Particular attention is given to the recessives at low frequency, which occur commonly in natural populations; variation within lines increases to a maximum when the inbreeding coefficient, F, is approximately 0·5 and becomes negligible when inbreeding is complete. The additive component of variance behaves similarly. Total variance in the population increases linearly with the inbreeding coefficient. Variance occurring in the crosses made between members of a group of inbred lines comprises a component due to the general combining ability of lines, proportional to F, and a component dependent on the specific combining ability of particular crosses, proportional to F^2; thus as inbreeding progresses the specific combining ability becomes most important.
There is evidence that these conclusions can be applied to genes showing overdominance.
When selection is carried out against a homozygous recessive, the genetic variance is no longer dependent on the inbreeding coefficient alone, but also on the number of generations during which inbreeding and selection have proceeded.

2391 CASPERSSON, T.
Some recent developments in ultramicrospectrography.
Genet. Iber. 1950 : **2** : 277–86.

An account is given of the Institute for Cell Research in Stockholm, designed for studying quantitative methods of cytochemical research and their application to biological problems. Ultraviolet microspectrographic investigations have shown that heterochromatic regions act as

regulating centres for the protein metabolism of gene-carrying elements. Various refinements of technique described include one which aims at the study of the orientation of the DNA molecule during gene reproduction.

2392 POLITIS, J.
Sur des gènes produisant de l'anthocyane dans les plantules de *Raphanus sativus* et d'autres Crucifères. **(On genes producing anthocyanin in the seedlings of *R. sativus* and other Cruciferae).**
CR Acad. Sci. Paris 1947 : **225** : 256–57.
The anthocyanin pigmentation of the hypodermis of the hypocotyl of *R. sativus* and various other Cruciferae develops in a body termed the cyanoplast which arises near the nucleus and has a limited power of multiplication by budding. It is suggested that the cyanoplast is a gene that has migrated into the cytoplasm from the nucleus.

2393 POLITIS, J.
Sur des gènes produisant de l'anthocyane dans les bulbes de *Hyacinthus orientalis* et sur l'influence de la lumière sur ces gènes. **(On genes producing anthocyanin in the bulbs of *H. orientalis* and on the influence of light on these genes).**
CR Acad. Sci. Paris 1947 : **225** : 356–58.
The anthocyanin pigmentation of the bulbs in some varieties of *H. orientalis* arises in a corpuscle adjacent to the nucleus. The corpuscle has limited powers of multiplication by budding and the products finally round off and discharge into a pigmented vacuole. The author suggests that the corpuscle is a gene (cf. Abst. 2392).

2394 POLITIS, J.
Sur des gènes élaborateurs de pigments anthocyaniques des anthères des fleurs de *Pirus communis* et d'autres plantes. **(On genes elaborating anthocyanin pigments in the anthers of the flowers of *P. communis* and other plants).**
CR Acad. Sci. Paris 1947 : **225** : 889–91.
Three different modes of origin of anthocyanin pigmentation in the anthers of selected flowering plants are described, namely (1) from a single cyanoplast, (2) from several spherules, and (3) from a complex of filaments. The bodies concerned are believed to have a nature comparable to that of the genes.

2395 CASPARI, E.
Pleiotropic gene action.
Evolution, Lancaster, Pa 1952 : **6** : 1–18.
A general review of papers on pleiotropy is presented, the following aspects being discussed: developmental analysis, multiple allelic series, dominance and penetrance, and pleiotropic effects in generalized characters and at the biochemical level. The review refers chiefly to *Drosophila* and other animal organisms but cases of pleiotropy in maize, *Oenothera* and *Neurospora* are also examined.

2396 EPHRUSSI, B.
Quelques problèmes de la génétique des microorganismes. **(Some problems of the genetics of microorganisms).**
Arch. Klaus-Stift. VererbForsch. 1951 : **26** : 403–25.
The role of the cytoplasm in inheritance is demonstrated by a review of the genetics of respiratory function in yeast (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 857), the killer character in *Paramecium* and the cytoplasmic control of the manifestation of certain genes determining antigenic types in *Paramecium* under the influence of temperature (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1331).

2397 OEHLKERS, F.
Neue Überlegungen zum Problem der ausserkaryotischen Vererbung. **(New considerations on the problem of extranuclear inheritance).**
Z. indukt. Abstamm.- u. VererbLehre 1952 : **84** : 213–50.
Results of previous research of many investigators on the problems relating to extranuclear inheritance are critically surveyed; among the aspects considered are the constancy of the cytoplasm, the relation between the genome and the plasmon and the variation of the plasmon.

VARIATIONS, MODIFICATIONS, MUTATIONS

2398 HALDANE, J. B. S.
Variation.
New Biology 1952 : No. 12 : 9–26.
A popular account is given of different types of variation and the controlling nutritional and genetical factors. Methods by which genetic variations are able to persist in populations subjected to natural selection are discussed, with reference to clines, harmful mutant genes whose frequency balances the suppressing effects of selection, heterozygotic allelomorphic factors remaining in equilibrium with less successful homozygotes, sex-linked genes and the intermediate phase of equilibrium which occurs when a new form is evolved.

2399 ESNAULT-PELTERIE, R.
Remarques sur une formule usuelle. (**Remarks on a common formula**).
CR Acad. Sci. Paris 1947 : **224** : 1404–07.
A mathematical discussion is presented of the way in which unequal sexual affinity between gametes may modify the frequencies of individuals mating at random in a closed population. It is pointed out that unequal sexual affinity may result in the complete elimination of some classes of preexisting homozygotes.

2400 ESNAULT-PELTERIE, R.
Remarques sur une formule usuelle. (**Remarks on a common formula**).
CR Acad. Sci. Paris 1947 : **224** : 1462–64.
Continuing his studies on the effects of unequal sexual affinity on population equilibrium (cf. Abst. 2399), the author calculates the times taken for one set of homozygotes to replace another with a lower sexual affinity. For an excess of vitality of a race *A*A over a race *B*B of 1 : 1000, the replacement would take *ca.* 6900 generations.

2401 ESNAULT-PELTERIE, R.
Sur la répartition des produits d'un ensemble de fécondations avec croisements libres. (**On the distribution of the products of an assemblage of fertilizations with free crossing**).
CR Acad. Sci. Paris 1947 : **224** : 1796–99.
Continuing his discussion of the effects of unequal sexual affinity on population equilibrium (cf. Abst. 2399), the author analyses the effects resulting from various conditions and combinations of gametic hyperaffinity and hypoaffinity.

2402 GRANDJEAN, F.
Sur les rapports théoriques entre écarts et mutations. (**On the theoretical relations between variants and mutations**).
CR Acad. Sci. Paris 1949 : **228** : 1675–78.
In this theoretical discussion, the author inquires as to whether some unifying explanation can be given for mutants and fluctuations phenotypically similar to them.

2403 CHEVALIER, A.
L'apparition dans la nature de mutations végétales, leur persistance ou leur extinction. (**The appearance in nature of plant mutations, their persistence and their extinction**).
CR Acad. Sci. Paris 1948 : **227** : 1126–28.
Studies on *Chelidonium laciniatum* and *Cymbalaria Toutoni* are reported to show that these two mutants fail to maintain themselves under natural conditions.

2404 BLARINGHEM, L.
Stabilité des mutations accidentelles. (**Stability of chance mutations**).
CR Acad. Sci. Paris 1948 : **227** : 1305–08.
Commenting on the paper by Chevalier on naturally occurring mutations, the author considers the stability and taxonomic status of the plants discussed.

2405 CHEVALIER, A.
Sur une virose remarquable ayant fait apparaître une espèce linnéenne nouvelle par mutation de la cymbalaire des murailles. (**On a noteworthy case of virus infection responsible for the appearance of a new Linnean species by mutation of *Cymbalaria muralis***).
CR Acad. Sci. Paris 1949 : **228** : 1077–79.
The appearance of the mutant species *Cymbalaria Toutoni* is thought to be due to virus infection.

2406 CHEVALIER, A.
La cymbalaire de Touton est probablement une virose ou une bactériose. (***Cymbalaria Toutoni* is probably a virus or bacterial condition**).
CR Acad. Sci. Paris 1949 : **228** : 1176–78.
The mutant species *C. Toutoni* is thought to have arisen from *C. muralis* either by virus or bacterial action.

2407 CHEVALIER, A.
La cause initiale des mutations vriesiennes d'après des observations récentes faites sur des *Oenothera* et des *Cymbalaria*. (**The initial cause of Vriesian mutations in the light of recent observations on *Oenothera* and *Cymbalaria***).
CR Acad. Sci. Paris 1949 : **228** : 1537–39.
Bacterial or virus action is believed to be responsible for the origin of *C. Toutoni* and some of the macromutant *Oenothera* types.

2408 CHEVALIER, A.
La mutation de la cymbalaire de Touton et l'hérédité des tératomes provoqués par les viroses et bactérioses. (**The mutation of *Cymbalaria Toutoni* and the heredity of the teratomes induced by viruses and bacteria**).
CR Acad. Sci. Paris 1949 : **228** : 1617–19.
The author believes that bacterial and virus infection may bring about mutation; *C. Toutoni* is cited as an example.

2409 CHEVALIER, A.
Sur la biologie d'une plante se rapprochant du vrai *Oenothera lamarckiana* Sér., les variations de celui-ci et les viroses et bactérioses des *Oenothera*'s. **(On the biology of a plant approaching true *Oe. lamarckiana* Sér., on its variations, and on virus and bacterial infections of *Oenothera* types).**
CR Acad. Sci. Paris 1949 : **229** : 93–95.

An examination of type material of *Oenothera* species and mutants suggests that bacterial or virus infection may be responsible for some of their distinguishing characteristics.

2410 **Discussion on radiation microbiology and biochemistry.**
J. Cell. Comp. Physiol. 1952 : **39** : Suppl. 1.

The following papers were read at the research conference for biology and medicine conducted by the Atomic Energy Commission, Oak Ridge, Tenn., in April, 1949.

Newcombe, H. B. A comparison of spontaneous and induced mutations of Escherichia coli *to streptomycin resistance and dependence.* (*pp. 13–26*).

Streptomycin resistant mutants of *E. coli* B/r induced by ultraviolet irradiation will not form visible colonies unless streptomycin is present in concentrations above a minimum of 32–128 units per cm.^{3}, whereas spontaneous mutants and those induced by γ irradiation either grow normally or produce minute colonies in the absence of streptomycin. Since variants with respect to streptomycin resistance are known to occur mainly through mutation at a single locus, it appears that the direction of mutation to various allelic forms at a single locus is influenced by the mutagenic agent.

Swanson, C. P. The effect of supplementary factors on the radiation-induced frequency of mutations in Aspergillus terreus. (*pp. 27–38*).

Data are presented to show that by pretreating spores of *A. terreus* with infrared radiation or nitrogen mustard the mutation frequencies induced by X rays and ultraviolet irradiation can be significantly modified. It is suggested that an increased frequency of ultraviolet-induced mutations resulting from pretreatment with nitrogen mustard is due to an increase in the rate of intragenic, rather than chromosomal, changes.

Gray, L. H. The energy transfer from ionizing particles to an aqueous medium and its bearing on the interpretation of radiochemical and radiobiological change. (*pp. 57–74*).

Information concerning the dissipation of energy by ionizing particles in aqueous media is discussed in an attempt to elucidate the processes by which gene mutation and chromosome fragmentation occur. It is suggested that since a gene would probably be lethally damaged by a single ionization, mutation may result from mere excitation caused by the passage of an ionizing particle. There is also evidence that the effect of passing ionizing particles through or near a chromosome influences the frequency of breakage.

Zirkle, R. E., Marchbank, D. F. and Duck, K. D. Exponential and sigmoid survival curves resulting from alpha and X irradiation of Aspergillus *spores.* (*pp. 75–85*).

Experimental results show that when spores of *A. terreus* are subjected to radiation, the survival fraction plotted against dosage gives an exponential curve with respect to α particles and a sigmoid curve for X rays; the latter agrees with the two-hit theory. It is assumed that lethal effects are produced by one suitably located α track, whereas two or more electron tracks are required to produce the same alteration.

Stapleton, G. E., Hollaender, A. and Martin, F. L. Mechanism of lethal and mutagenic action of ionizing radiation on Aspergillus terreus. *I. Relationship of relative biological efficiency to ion density.* (*pp. 87–100*).

Further evidence is presented (cf. *Plant Breeding Abstracts,* Vol. XX, Abst. 1459) showing that densely ionizing α particles and protons, which have greater lethal efficiency than electrons, are less effective mutagenic agents. The rate of mutation due to X rays or α particles has a linear relationship with dose over a wide range, indicating the occurrence of single event gene mutations, but at higher doses the mutation curve is in agreement with that obtained for two-hit chromosomal aberrations. Above 60 kr. an increase in the rate of mutation due to X rays coincides with an increase in the rate of inactivation, indicating the possibility of a similar fundamental mechanism for both lethal and mutagenic action at high dose levels. It is suggested that some form of indirect influence resulting from radiation may be responsible for

lethal effects; thus a single densely ionizing proton or α particle would impart a concentration of the toxic agent comparable with that produced by the passage of several electrons; this might explain the cumulative action of X rays.

Stapleton, G. E. and Hollaender, A. Mechanism of lethal and mutagenic action of ionizing radiations on Aspergillus terreus. *II. Use of modifying agents and conditions.* (*pp. 101–13*).

It would appear from this investigation that two mechanisms with direct and indirect action respectively, exist for the production of mutations by X rays; removal of water or oxygen prior to irradiation influences only one of these mechanisms. This is consistent with the hypothesis that the indirect effects of radiation influence mutagenic activity as well as lethal action.

Kelner, A. Experiments on photoreactivation with bacteria and other micro-organisms. (*pp. 115–17*).

The general characteristics of photoreactivation are discussed with reference to genetic aspects summarized in Abst. 81.

Luria, S. E. Reactivation of ultraviolet-irradiated bacteriophage by multiple infection. (*pp. 119–23*).

The substance of this paper has already been summarized (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2436).

Dulbecco, R. Experiments on photoreactivation of inactive bacteriophages. (*pp. 125–28*).

Factors influencing photoreactivation are discussed, with reference to the relationship between photoreactivation and multiplicity reactivation, which can take place in the dark; only phage T2 readily undergoes reactivation of both kinds.

2411 Kjeldgaard, N. O.
Om bakteriofager. (**On bacteriophages**).
Nat. Verd. 1951 : **35** : 225–50.

Existing knowledge on bacteriophages, including the history of their life cycle, is reviewed, with brief sections on mutations in bacteria and bacteriophages and on lysogenic bacteria.

2412 Lewin, R. A.
Ultraviolet induced mutations in *Chlamydomonas moewusii* Gerloff.
J. Gen. Microbiol. 1952 : **6** : 233–48.

Detailed descriptions are given of mutant types of *Ch. Moewusii* obtained over several years at Yale University, Conn. (cf. *Plant Breeding Abstracts*, Vol. XX, Absts. 729 and 2046). M 470, a misdividing mutant resembling a small *Pandorina*, has been used in hybridization experiments to transmit the single mutant gene determining abnormal and incomplete cell division. Mutations affecting flagellar activity in M 236, M 375 and M 701 are dependent on single genes which are neither allelic nor linked. The nonphotosynthetic mutant M 151 has been used in several crosses and also appears to result from a single gene mutation; considerable reduction in viability of cells bearing this gene, however, complicates the analysis of progenies.

2413 McElroy, W. D.
Evidence of the occurrence of intermediates during mutation.
Science 1952 : **115** : 623–26.

Experiments were carried out to study: (1) the effects of high pressure upon the rate of mutation induced by ultraviolet light in *Neurospora crassa*; (2) the combined effects of nitrogen mustard, ultraviolet irradiation and high pressure upon the mutation rate in *Aspergillus terreus*; and (3) the effects of temperature and high pressure upon the frequency of mutants of both organisms. In all cases the mutants studied were morphological. The results suggested that changes are induced directly in the chromosome by the energy absorbed from the ultraviolet light, rather than indirectly by a chemical mutagen induced by the radiation. Probably, however, a large number of these changes is due to the production of a chemical mutagen which reacts with the chromosomes and other cellular constituents. Molecular changes induced either directly or indirectly by ultraviolet light, or by nitrogen mustard, result in semiactivated chromosomes. These structural alterations, it is suggested, finally undergo decomposition to either the original state or to mutation. Supplementary treatments act upon the semi-activated chromosomes during a latent period of stabilization. Molecular alteration giving rise to mutation is apparently accompanied by an increase in volume since high pressure prevents its occurrence.

2414 Oehlkers, F.
Mutationsauslösung durch Chemikalien. (**Induction of mutation by means of chemical substances**).
S.B. Heidelberg. Akad. Wiss. 1949 : 373–410.

The mutagenic substances tested by the author are listed and the process of mutation is analysed

from the standpoint of (1) the primary underlying phenomena and (2) distribution of translocations with regard to the genomes and to the chromosomes. In conclusion mutagenic and cytostatic substances, and the causes of induced and spontaneous mutation are briefly discussed.

2415 KAPLAN, R. W.
Mutationsauslösung bei *Bacterium prodigiosum* durch sichtbares Licht nach Vitalfärbung mit Erythrosin. **(Inducing mutations in *B. prodigiosum* by visible light after vital staining with erythrosin).**
Arch. Mikrobiol. 1950 : **15** : 152–75.

Resting cells of *B. prodigiosum* were suspended for some hours in aqueous erythrosin solution and then irradiated with visible light. After 48 hours the viable count was found to have decreased and the percentage of dwarf colonies to have increased. Cultures from the dwarf colonies proved the heritable character of the dwarf growth, which is due to a decrease in the rate of growth of the mutated cells as compared with that of cells of the initial strain. Subsequent cultures from the dwarf colonies indicated in one case the presence of two and in another the presence of three genotypes in the dwarfed parent colony; in later cultures these genotypes had apparently passed from the earlier labile state after irradiation into a stable condition. The possibility of the existence of separate hereditary units in a more or less free state in the cell is considered in connexion with this peculiar mode of inheritance.
Photodynamic inhibition of the capacity to form colonies is a one-hit event. The dependence of photodynamic mutability on the light dosage corresponds to a two-hit function, but in the case of U.V. the corresponding curve represents a one-hit function. An explanation of this difference is sought in the small amount of energy from quanta in the effective visible light being insufficient to supply the activation energy for the dwarf growth mutations; whence it is deduced that the activation energy for these mutations should be above 1·5–2 e V and the energy required for inhibition of the capacity to form colonies is below 1·5 e V. Evidence from the different effects of U.V. and visible light in work of the author and others is adduced to show that the inhibition of the capacity to form colonies is not to be regarded simply as a lethal mutation.
If the light dosage, time for staining and temperature are constant then the relation between photodynamic mutability and the concentration of erythrosin is represented by a one-hit function; hence it is concluded that the attachment of one molecule of stain in the hit region is enough to increase the photosensibility so that one mutation can occur; the stain must be adsorbed on the genetic structures in such a way that the energy of light adsorbed by the stain can then be used in mutation.
The variation of the photodynamic mutability with the time allowed for staining gives a curve similar to that of a one-hit function.
The relation of the photodynamic mutability to the temperature during staining corresponds to a curve with an optimum at 20°–25° C.

2416 DEUFEL, J.
Auslösung von Chromosomenmutationen durch Äthylurethan in Abhängigkeit von der Konzentration. **(Induction of chromosome mutations by ethylurethane in relation to the concentration).**
Chromosoma 1952 : **4** : 611–20.

In this study of the action of different concentrations of ethylurethane in mitosis in *Vicia Faba*, the highest concentrations had not the greatest mutagenic effect. Chromosome aberrations, breaks and recombinations were most readily obtained with concentrations of M/50.
It seems likely that both the concentration and physiological condition of the cells and nuclei are important factors in determining whether restitution and recombination occur.
Translocations took place almost exclusively between chromatids and half chromatids, and even in one case recombination between quarter chromatids was observed.
The small chromosome showed breaks mainly in the central region, while in the large chromosomes, the SAT and insertion regions and the neighbouring parts showed most tendency to breakage.

2417 DE HAAN, H.
Periklinale chimaeren bij knopmutanten. **(Periclinal chimeras in bud sports).**
Euphytica, Wageningen 1952 : **1** : 49–56.

The findings of Dermen, Imai, Asseeva and other investigators, whose results have been reviewed from time to time in *Plant Breeding Abstracts*, are considered from the following aspects: the origin of periclinal chimeras as a result of somatic mutation; the way in which they are affected by sexual reproduction; and their occurrence in bud mutants of vegetatively reproduced crop plants.
Many widely grown bud sports can, in the writer's opinion, be shown to be periclinal

chimeras, from some of which, by the formation of adventitious buds, homogeneous bud sports may have arisen (cf. *Plant Breeding Abstracts*, Vol. XVII, Absts. 1072 and 1308 and Vol. XIX, Absts. 68 and 1206).

ADAPTATION

2418 WINTREBERT, P.
Le lamarckisme chimique. (**Chemical Lamarckism**).
CR Acad. Sci. Paris 1949 : **228** : 1079–82.
Recent work on induced mutation in micro-organisms and the experiments of Daniel and Lysenko on graft hybridization are believed to afford a sufficient basis for the reinstatement of Lamarckism.

2419 BRIX, K.
Untersuchungen über den Einfluss der Pfropfung auf Reis und Unterlage und die Möglichkeit einer Übertragung eventueller Veränderungen auf die Nachkommen. (**Investigations on the influence of grafting on scion and stock and the possibility of transmission of any changes to the progeny**).
Z. Pflanzenz 1952 : **31** : p. 261.
Preliminary experiments were made with winter wheat and winter rye grafted on spring wheat, the controls being winter wheat grafted on winter wheat, winter rye on winter rye and untreated plants. The main experiments were carried out with tomato varieties in relation to the colour and shape of the fruit and the form of the leaves. The necessity for control experiments is stressed and the essential conditions for them in the case of the tomato especially are set out; for this plant the controls must be shoots from the same plant as is used in the experiment.
A statistically verified influence due to grafting was found in the case of endosperm grafting in the cereals, the readiness to shoot of the winter forms being increased. In the tomato, significant quantitative differences due to grafting were observed in (1) the number of indentations in the leaflets, (2) the length of the leaflet stem, and (3) the mode of insertion of the leaflet. The colour and the shape of the fruit, however, were found to be highly stable or highly variable characters, according to the race used, irrespective of grafting. In all the large-fruited forms the size of the fruit varied greatly, but in grafted scions it only altered in those cases in which the leaves were removed from the scion after grafting.
In the few cases in which progeny of grafted tomato plants were investigated the results allowed of no positive conclusions concerning the transmission of characters produced by grafting.

2420 BEGG, M. and WADDINGTON, C. H.
Selection of the genetic basis for an acquired character.
Nature, Lond. 1952 : **169** : 625–26.
M. Begg refers to the results obtained with the mutant antennaless in *Drosophila* and expresses the view that they are analogous with those obtained by Waddington in the case of the crossveinless character; he criticizes, however, Waddington's extension of the use of the term acquired character beyond the concept of direct adaptation (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 1595). C. H. Waddington denies the validity of the suggested analogy on the grounds that the selection experiments of Begg involved normal conditions and merely confirm the well-known fact that by selection and inbreeding in a uniform environment lines differing in the frequency or intensity of manifestation of the mutant character can be established. In discussing the role of inheritance and environment in determining a character, Waddington argues that a character in certain circumstances can appear in the next generation in the absence of the stimulus necessary for the development of the character.

EVOLUTION

2421 GRANDJEAN, F.
Sur la distinction de deux sortes de temps en biologie évolutive et sur l'attribution d'une phylogenèse particulière à chaque état statique de l'ontogenèse. (**On the distinction of two sorts of time in developmental biology and on the attribution of a particular phylogeny to each stage of ontogenesis**).
CR Acad. Sci. Paris 1947 : **225** : 612–15.
A distinction is drawn between ontogenetic (t) and phylogenetic (T) time scales, which may sometimes be treated as independent variables. Thus ontogenesis may be represented as a function of t with T constant, and *vice versa* for phylogeny.
It is further pointed out that, by comparing different stages of development of an organism, i.e. comparisons involving various values of t, in studying an evolutionary sequence, it may be necessary to recognize several divergent phylogenetic sequences within the same evolutionary line of descent.

2422 GRANDJEAN, F.
L'harmonie et la dysharmonie chronologiques dans l'évolution des stases. **(Chronological harmony and dysharmony in the evolution of stages).**
CR Acad. Sci. Paris 1947 : **225** : 1047–50.

Continuing his analysis of ontogenetic (t) and phylogenetic (T) time scales (cf. Abst. 2421) the author defines the following concepts. A discontinuous change in any character is said to be chronologically harmonious if, in a graph whose ordinates represent ontogenetic and phylogenetic time respectively, the curve plotting the distribution of the change is uniflected. Should the change occur at the same value of T for all t, then the case is described as one of vertical harmony. Should the first occurrence of the change in T correspond to a late value of t which decreases with increase in T, we have an instance of descending harmony, and conversely, should the first occurrence in T correspond to an early value of t which increases with increase in T, we have an instance of ascending harmony.
When the curve for the change is not a regular curve of the first order, the change is said to be dysharmonious.

2423 MALHEIROS-GARDÉ, N. and GARDÉ, A.
Fragmentation as a possible evolutionary process in the genus *Luzula* DC.
Genet. Iber. 1950 : **2** : 257–62.

The diffused centromere characteristic of the genus seems to have favoured a process of increase in chromosome number due to fragmentation, referred to as agmatoploidy, which, it is suggested, may also have occurred in the evolution of the related genus *Carex*.

2424 FERNANDES, A.
Sur la phylogénie des espèces du genre *Narcissus* L. **(On the phylogeny of the species of the genus *Narcissus* L.).**
Bol. Soc. Broteriana 1952 : **25** : 113–90.

Having completed a study of the cytology and external morphology of all the Linnean species of *Narcissus* the author discusses: (1) his evidence concerning the probable phylogenetic relationships between the various species; (2) the nature and importance of the processes underlying evolution in *Narcissus*; (3) the caryology and systematic classification of the species in the group, with a suggestion for a new classification of the genus.

Narcissus comprises an aneuploid series of chromosome numbers, 7, 10, 11, 13, 15 and 25, the first three being the basic numbers of three polyploid series. The geographical distribution and other evidence indicate that $x = 7$ and from this the numbers 10, 11, 13, 15 and 25 are derived. The genus is of monophyletic origin.

2425 BAKER, H. G.
The ecospecies—prelude to discussion.
Evolution, Lancaster, Pa 1952 : **6** : 61–68.

The unsuitability of the taxonomic species as a unit of evolution is stressed. The author believes that in many problems of microevolution use of the categories of biosystematics is preferable, although not as useful as a general classification in tracing phylogeny. Definitions of ecospecies, the problem of equivalence between taxonomic species and ecospecies, and genetical criteria of ecospecific distinction are discussed. A collection of published definitions of the ecospecies is appended. The development of hybrid incapacity is considered to occur too irregularly to provide the only criterion of ecospecific distinction. The dividing line between ecotype and ecospecies, it is suggested, should be drawn at the level where the first bar to crossing is imposed which is not purely concerned with habitat preference. The bar may be mechanical, physiological or operative during meiosis. Possible ways of testing for such barriers are discussed.

2426 BURTT, B. L.
Joint discussion with the Systematics Association : taxonomic treatment of biological races. The taxonomic treatment of biological races in flowering plants.
Proc. Linn. Soc. Lond. 1952 : **163** : 40–47.

Rare cases which necessitate some method of classifying distinct biological races are discussed, with reference to otherwise homogeneous stands of *Eucalyptus australiana* containing variants which produce commercially unacceptable oils, and variation in the frost resistance of *Pinus sylvestris* from different latitudes.

2427 MANGELSDORF, P. C.
Evolution under domestication.
Amer. Nat. 1952 : **86** : 65–77.

The role of mutation, genetic drift, hybridization and selection in the domestication of maize and other plants is discussed.

*CYTOLOGY

2428 Barigozzi, C.
La struttura microscopica del nucleo durante il riposo. (**The microscopic structure of the resting nucleus**).
Experientia, Basel 1952 : **8** : 133–36.

The various microscopic techniques that have been evolved in the study of the resting nucleus are outlined with a critical commentary on the cytological significance of the various structures observed in different types of cells and in different species of organisms. Isolated chromosomes may provide information on the spiralization cycle and the length of the threads during the stage of gene activity in the nucleus.

2429 Bringmann, G.
Über Beziehungen der Kernäquivalente von Schizophyten zu den Mitochondrien höher organisierter Zellen. (**On the relationships of the nuclear equivalents of schizophytes to the mitochondria of more highly organized cells**).
Planta 1952 : **40** : 398–406.

The nuclear structures of the Cyanophyceae and bacteria may contain, in addition to desoxyribose nucleic acid, also ribose nucleic acid, phosphates and lipoids. From the presence of these substances it seems probable that a relationship exists between the nuclear structures of schizophytes and the mitochondria of more highly organized cells. It appears possible that the cell nucleus, mitochondria and plastids may have a common origin.

2430 Boivin, A., Vendrely, R. and Vendrely, C.
L'acide désoxyribonucléique du noyau cellulaire, dépositaire des caractères héréditaires; arguments d'ordre analytique. (**The desoxyribose nucleic acid of the cell nucleus, the depository of the hereditary characters; arguments in connexion with analysis**).
CR Acad. Sci. Paris 1948 : **226** : 1061–63.

The contents of desoxyribose nucleic acid per nucleus in the somatic cells of different tissues of the cow were found to be approximately constant, namely, $6{\cdot}5 \times 10^{-6}\,\gamma$. In the spermatozoa, however, the content was $3{\cdot}4 \times 10^{-6}\,\gamma$. For bacteria, the corresponding value was of the order of $10^{-8}\,\gamma$.

2431 Dangeard, P.
Sur les chromocentres rattachés aux nucléoles dans les noyaux euchromocentriques et sur une distinction à faire parmi ces noyaux. (**On the chromocentres attached to the nucleoli in euchromatic nuclei and on a distinction to be drawn concerning these nuclei**).
CR Acad. Sci. Paris 1946 : **223** : 253–54.

It is reported that the filament between the nucleoli and nucleolar centromeres in euchromatic nuclei may be of considerable tenacity; it appears to consist of thymonucleic acid.
A distinction is drawn between two types of euchromatic nuclei, namely (1) isochromocentric nuclei, with as many chromocentres as chromosomes, and (2) oligochromosomic nuclei, with fewer chromocentres than chromosomes.

2432 Bajer, A.
Electrical forces in mitosis. I.
Acta Soc. Bot. Polon. 1950 : **20** : 709–37.

The effects of electrostatic fields of different intensities upon chromosome movement during mitosis were studied in staminal hairs of *Tradescantia virginica*. The results led to the conclusion that the chromosomes themselves were not electrically charged either in resting or mitotic nuclei. The electrostatic field however affected chromosome movement by influencing the spindle, and induced structural changes in the chromosomes. Cell division ceased with the application of a strong field (4150 v/cm.) for a few minutes; the circulation of the cytoplasm stopped after duration of this field for some hours.

2433 McDonough, E. S., Rowan, M. and Mohn, N.
Structure and staining reactions of salivary gland chromosomes of Drosophila treated with crystalline desoxyribonuclease.
J. Hered. 1952 : **43** : 3–7.

The microscopic structure of the chromosomes was maintained when desoxyribonucleic acid was removed by treatment with crystalline desoxyribonuclease, residual and basic proteins being left as the chief components. The bearing of this result upon the problem of chromosome and gene structure is briefly discussed.

* General studies, see also individual crops.

2434 MENDES CONAGIN, C. H. T.
Ação do paradiclorobenzeno sôbre os cromossômios somáticos. (**Action of p-dichlorobenzene on somatic chromosomes**).
Bragantia, São Paulo 1950 : **10** : 365–69.
Treatment of roots of *Coffea arabica*, *Allium Cepa*, *Arachis prostrata* and *Aloe* sp. with p-dichlorobenzene before fixing caused contraction of the chromosomes, which greatly facilitated their counting. Constrictions and satellites also became more evident.

2435 MENDES CONAGIN, C. H. T.
Paradichlorobenzene for chromosome counts.
Stain Tech. 1951 : **26** : p. 274.
The paradichlorobenzene-aceto-orcein process reported by Meyer (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 660) has proved successful with *Coffea arabica*, *Allium Cepa*, *Aloe* sp. and *Agave sisalana*. Paraffin sections of treated roots stained with Heidenhain hematoxylin according to Yamanouchi's schedule also gave good metaphase plates.

2436 BISHOP, C. J.
The influence of polyploidy on the X ray sensitivity of cells.
Canad. J. Bot. 1952 : **30** : 139–46.
From a detailed study of chromosomal aberrations induced in diploid *Tradescantia paludosa* and tetraploid *T. virginiana* by X irradiation at the resting stage between meiosis and pollen grain division and at the resting stage following mitotic pollen grain division, it was possible to compare the relative sensitivity of diploid and tetraploid cells. Tetraploid tissues appeared to contain many more aberrations than diploid cells at both stages, but when the number of breaks per chromosome was compared there was no significant difference between the two species.

2437 BONNIER, G. and LÜNING, K. G.
Interaction of centromere and cytoplasm in chromosome elimination in *Drosophila melanogaster*.
Hereditas, Lund 1952 : **38** : 339–44.
The results of experiments on the production of gynandromorphs, through chromosome elimination, suggest that different paternal centromeres may behave differentially according to the maternal cytoplasm into which they are introduced and according to the maternal genome under whose control the cytoplasm is produced.

2438 DANIELLI, J. F.
On transplanting nuclei.
Sci. Amer. 1952 : **186** : No. 4 : 59–64.
Observations made at King's College, London, indicate that the cytoplasm of *Amoeba discoides* and *A. proteus* controls the size of nuclei in daughter cells derived from individuals whose nuclei have been interspecifically exchanged. This cytoplasmic effect on nuclear size is still obvious after three years. A transplanted nucleus has no apparent influence on the form assumed by the cytoplasm of daughter cells during movement, but after three years the shape has become intermediate between the two species, showing the combined influence of both nucleus and cytoplasm.
Preliminary studies with nitrogen mustard have shown that when only the cytoplasm is exposed to treatment the individual dies within a few days, but if the nucleus is lethally damaged and inserted into normal cytoplasm the organism may live somewhat longer.

2439 HOHL, K.
Vergleichende Untersuchungen über die Beeinflussung der Mitose durch Röntgenstrahlen und chemische Stoffe. (**Comparative investigations on the influence of X rays and chemical substances on mitosis**).
Radiol. Clin. 1948 : **17** : 302–09.
The following three typical changes, resulting from ionization effects consequent upon absorption of protons, neutrons, X rays or ultraviolet rays in root meristems of *Vicia Faba* and *Allium Cepa*, are discussed: chromosome pycnosis, chromosome breakage and the elimination of centromere action.
Among the antimitotic substances affecting only mitosis and with no apparent damage to permanent cells, trypaflavin alone affects the chromosome matrix in a way cytologically indistinguishable from chromosome pycnosis. Experiments also showed that pycnosis is not a specific reaction and can be induced by ionization, chemical treatment or dehydration with glucose and calcium solutions. Moreover, when slight, pycnosis is reversible; a more pronounced degree is not. Chromosome breakage appears to be specifically an irradiation process, and, where present after chemical treatment, is probably a secondary phenomenon. The author found that nitrogen mustard damaged the centromere in the same way as a hit following X irradiation.
Antimitotic substances, such as trypaflavin, urethane, nitrogen mustard, chinone and

colchicine, either affect certain chemical reactions in mitosis or, in some as yet unknown way, interfere with the protein metabolism of the cell.

2440 BAJER, A. and HRYNKIEWICZ, A. Z.
Notes on the anaphase mechanism and the energy of chromosome movement.
Acta. Soc. Bot. Polon. 1951 : **21** : 5–15.
The dependence of the rate of chromosome movement at mitosis on the age of the cell and prevailing temperature is discussed, with reference to other factors controlling the viscosity coefficient of the spindle, the shape and orientation of the chromosomes and the distances over which they move.
Methods are described for determining differences between the respective energies of two groups of chromosomes in one cell and also of chromosomes in different cells.

2441 MOLÈ-BAJER, J.
Influence of hydration and dehydration on mitosis. I.
Acta Soc. Bot. Polon. 1951 : **21** : 73–94.
Chromosome movements observed at anaphase in staminate hairs of *Tradescantia* treated with KNO_3 and $Ca(NO_3)_2$ indicate that these substances induce changes in the submicroscopical structure of the spindle. Low concentrations of K ions cause hydration, decreasing the viscosity resistance of the cytoplasm and accelerating chromosome movement, but strong concentrations of K ions tend to destroy the polypeptide chains composing the spindle and thus movement ceases.
Conversely, Ca ions cause dehydration and gradually increase the viscosity resistance of the cytoplasm, prolonging and finally stopping the anaphase movement of the chromosomes.

2442 BAJER, A.
Studies on spindle and chromosome movement.
Acta Soc. Bot. Polon. 1951 : **21** : 95–111.
Measurements of spindle length at metaphase and anaphase during mitosis in root tips of numerous plants, including *Allium Cepa*, *Vicia Faba* and *Triticum vulgare* which have large chromosomes and *Brassica Napus* which has small chromosomes, indicate that the slight increase in length at anaphase may be attributed to an inability to see the spindle poles distinctly during metaphase; the apices of the spindle become clearly discernible at anaphase. That the apparent lengthening, thought to be due to elongation of the spindle fibres, may in fact be nonexistent is discussed; elongating spindle fibres or contracting traction fibres have not yet been demonstrated in plants.
In very narrow cells with large chromosomes there is not sufficient breadth to accommodate the metaphase plate in a position perpendicular to the long axis, thus the plates form obliquely. Under such crowded conditions the chromosomes cannot move apart simultaneously at anaphase; results of observations show that each chromosome retains the ability to move independently for a considerable period. When squeezed together in a narrow cell chromosomal orientation is often irregular so that sometimes an arm precedes the kinetochore in movement towards the spindle pole; this occurs more frequently in *T. vulgare* ($2n = 42$) than in *A. Cepa* ($2n = 16$) or *V. Faba* ($2n = 12$) and is probably caused by a larger number of chromosomes.

2443 COMPTON, W.
The effects of maleic hydrazide on growth and cell division in *Pisum sativum*.
Bull. Torrey Bot. Cl. 1952 : **79** : 205–11.
Mitosis was temporarily inhibited in root and stem apices of *Pisum sativum* seedlings grown from seeds soaked in solutions of 50–1000 ppm. maleic hydrazide (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1576); 24 hours after treatment mitotic configurations were again observed. During the 24 hours following treatment any apparent growth was due solely to cell elongation. Normal cell division and elongation occurred after soaking in 10 ppm. maleic hydrazide.

2444 THERMAN, E.
Attraction of chromosomes in the mitosis and meiosis of *Ornithogalum*.
Arch. Soc. Zool. Bot. Fenn. 'Vanamo' 1951 : **6** : No. 1 : 17–18.
The following observations are reported and compared with mitotic and meiotic phenomena described by Darlington and others in Diptera. In mitotic metaphase plates of *O. caudatum* ($2n = 54$) the smaller chromosomes were usually situated in pairs. In meiosis 27 bivalents were formed; in diakinesis these repelled each other. At metaphase I the 7 larger bivalents were distributed at random; the 20 smaller ones formed pairs. Secondary association of the smaller chromosomes was noted during metaphase II. The course of meiosis was fairly regular. In *O. graminifolium* ($2n = 10$) most of the chromosomes paired at mitotic metaphase.

During meiosis a variable number of chromosomes remained as univalents. At metaphase I these paired somatically, and later segregated regularly or formed laggards. Meiosis was however remarkably regular in its results. These observations are discussed in relation to Darlington's precocity theory of meiosis. The author regards the meiotic and mitotic attraction of the chromosomes observed as unusually strong, and suggests that it depends upon the functional singleness of the chromosomes, brought about by the more or less pronounced state of precocity of the extrachromosomal changes in the cell.

2445 **Effects of atomic radiations.**
Twelfth Annual Biology Colloquium, April 21, 1951 : Pp. 52.

Stern, C. Problems of radiobiology with emphasis on radiation genetics. (*pp. 7–16*).

A general discussion is given of the cellular effects of radiation, with particular reference to the structural nature of the hereditary changes induced, the relation between dosage and frequency of hereditary changes, the target theory and calculation of gene size. Comments are also made on the effects of the induced hereditary changes upon the organism as a whole, effects of radiation upon the cytoplasm and on the general status of radiation biology.

Smith, L. The effects of atomic bomb-induced radiations on higher plants, particularly cereals. (*pp. 20–24*).

Studies by several investigators on the morphological effects, chromosomal aberrations and mutations induced by atomic bomb irradiation of cereals and other plants are surveyed (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2068; Vol. XIX, Abst. 273; Vol. XXI, Absts. 177 and 436; and Vol. XXII, Abst. 1876).

2446 Sax, K. and Luippold, H.
The effect of fractional X ray dosage on the frequency of chromosome aberrations.
Heredity 1952 : **6** : 127–31.

Lane, G. R.
Remarks on Sax and Luippold.
Ibid 1952 : **6** : 131–32.

Sax and Luippold present data showing that repeated experiments with pollen of *Tradescantia paludosa* fail to confirm the conclusions reached by Lane (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2352), who attributes the reduction of aberration frequency following fractional dosage to a depressing effect on chromosomal sensitivity to breakage. Fractional dosage, with resting periods of 4, 8 or 12 hours between two exposures of 180 r. each, reduced the frequency of aberrations below that obtained with a single dose of 360 r. There was no evidence of a recovery in breakage frequency with an increasing interval between exposures. The reduction in aberration frequency is due to restitution during the interval between the half doses; breaks induced at the first X irradiation do not therefore survive long resting periods and there are no broken ends to unite with fragments resulting from the second exposure.
These results are challenged by Lane on the grounds of insufficient experimental control with respect to temperature which affects the physiological processes involved. The material, intensity of dosage and time period between irradiation and fixation, employed by Sax and Luippold, also differed from those used by Lane.

2447 Deysson, M.
Action de l'uracile sur la division cellulaire chez l'*Allium Cepa* L. (**The action of uracil on cell division in *A. Cepa* L.**).
Bull. Soc. Bot. Fr. 1952 : **99** : 51–53.

Very weak concentrations of uracil (2–6 dihydroxypyrimidine) may stimulate cell division. Higher doses, however, act as a depressant and mitotic irregularities may occur; these included frequent fragmentation, following prolonged treatment with the drug, of one particular chromosome.

2448 Marquardt, H.
Die Auslösung von Chromosomenmutationen in der Meiosis durch tiefe Temperatur. (**The induction of chromosome mutations in meiosis by low temperature**).
Z. indukt. Abstamm. -u. VererbLehre 1952 : **84** : 169–81.

Experiments were made to determine the proportion of spontaneous chromosome aberrations in meiosis of *Oenothera Hookeri*, and also the proportions of chromosome changes in (1) cut inflorescences kept in water at 10° for 6 days and (2) pot plants also maintained at 10° C.
Results showed that meiosis is more sensitive than mitosis to temperature in its effect on the readiness with which chromosome aberrations occur.
In opposition to conclusions of other investigators based on work on mitosis, the author deduces from his study of meiosis that temperature exerts its effect at the stage in which breaks occur and low temperature increases the

number of potential breaks. The hypothesis is put forward that low temperature acts by raising the solubility of oxygen in the water contained in the protoplasts. In the experiments at 10° C no clear correlation was found between the frequency of chiasmata and proportion of aberrations.

2449 Kihlman, B.
A survey of purine derivatives as inducers of chromosome changes.
Hereditas, Lund 1952 : **38** : 115–27.

In addition to having a mutagenic effect on microorganisms, caffeine also induces chromosome changes, similar to those resulting from X irradiation, in root tips of *Allium Cepa* and *Pisum sativum*. In order to determine upon which chemical and physical properties of the caffeine molecule this radiomimetic effect depends, observations were made at the University of Uppsala, Sweden, on the radiomimetic influence of 24 purine derivatives closely related to caffeine; both types of root tips were used for comparison.

The toxicity of the purine derivatives, measured by the percentage of abnormal cells, increased with increasing concentration; the substitution of methyl groups in methylated purines with ethyl or other alkyl or alkoxy groups also increased the toxicity. Most of the N-alkylated oxypurines gave rise to polyploid cells by suppression of cell wall formation, whereas adenine and ethylxanthines caused c-mitosis. Chromosome changes resembled those induced by caffeine, although chromosomes of *Pisum* proved less susceptible to the radiomimetic effects of purines than those of *Allium*.

Purines such as 8-ethylthiocaffeine, 8-ethoxycaffeine and other 8-ethers of caffeine acted more rapidly than purines of the 1, 3, 7, 9-tetramethyluric acid type, producing chromosome breaks in most of the cells after a few hours. On the other hand, tetramethyluric acid purines only caused breaks in a large number of cells after a long period of treatment and in concentrations sufficiently low to permit mitotic activity during treatment. These differences are connected with variation in lipoid affinity between the two distinct groups of purines; substances resembling 8-ethoxycaffeine have a strong affinity for the lipoid phase and are thus able to penetrate the nuclear membrane more readily than purines of the tetramethyluric acid group; the latter can only enter the nucleus during mitosis when the nuclear membrane is disrupted, thus the dependence of their radiomimetic effect on the number of mitoses during a long period of treatment is explained.

Differences in the power of purine derivatives, once inside the nucleus, to induce chromosome breaks are discussed with particular reference to their (*a*) relative surface or boundary activities which would influence their rates of accumulation on chromosomal surfaces, (*b*) solubilizing actions on the genetic material, and (*c*) inhibitory effects on intranuclear enzymes.

2450 Taylor, H., Ives, P. T. and Evans, A. T.
Changing the gene order and number in natural populations.
Evolution, Lancaster, Pa 1952 : **6** : 19–28.

From experiments on *Drosophila melanogaster* evidence has been obtained of the existence of mutator genes which are capable of altering the sequence of genes on the X chromosome by causing inversions, whose location probably depends upon the position of heterochromatin. One strain carried a translocation of a small section of the X chromosome, involving three genically controlled breaks; as a result of crossing-over subsequent to transposition, about one-tenth of the genes were duplicated. The evolutionary role of mutator genes in natural populations is discussed.

2451 Deysson, G. and Édouard, P.
Fragmentation chromosomique sous l'influence du bornéol. (**Chromosome fragmentation under the influence of borneol**).
CR Acad. Sci. Paris 1949 : **229** : 772–73.

Borneol depresses cell division in *Allium Cepa*, has only slight c-mitotic effect, but readily induces chromosome fragmentation.

2452 Rees, H.
Asynapsis and spontaneous chromosome breakage in *Scilla*.
Heredity 1952 : **6** : 89–97.

Spontaneous chromosomal breakage has been observed in 0·94–5·8% of pollen mother cells in a diploid strain of *S. sibirica* ($2n = 12$). There is no evidence of chiasma formation, although homologous univalents are closely associated at anaphase; thus the first division is in effect mitotic. During this division the centric fragments divide and the acentric fragments become scattered. Apart from the disorganization resulting from breakages, it appears that the "singleness" of chromatids at interphase, in contrast with their state at normal meiotic interphase, precludes a second division; degeneration occurs soon after the first abnormal division.

2453 DEYSSON, G.
Action mitoclasique de l'antipyrine. (**The c-mitotic action of antipyrine**).
CR Acad. Sci. Paris 1949 : **228** : 1306–08.
At low concentrations antipyrine inhibits cell division (cf. Abst. 2454); at higher concentrations it brings about c-mitosis.

2454 DEYSSON, G.
Action mitodépressive de l'antipyrine. (**The action of antipyrine in depressing mitosis**).
CR Acad. Sci. Paris 1949 : **228** : 1047–49.
In weak concentrations, antipyrine inhibits cell division in *Allium Cepa* without any concurrent anomalies. After removal from the solution, normal cell division is resumed.

2455 JAEGER, P.
Sur la germination de la graine de l'*Androcymbium gramineum* Macbride en présence de colchicine. (**On the germination of the seed of *A. gramineum* Macbride in the presence of colchicine**).
CR Acad. Sci. Paris 1948 : **227** : 730–31.
A. gramineum, which contains colchicine in the natural state, is unaffected by the application of colchicine solution.

2456 SÖLLNER, R.
Nouvelle contribution à la cytotaxinomie du genre *Cerastium*. (**A new contribution to the cytotaxonomy of the genus *Cerastium***).
Experientia, Basel 1952 : **8** : 104–05.
The chromosome numbers of different species and populations of *Cerastium* from different localities, are reviewed. In the course of a biometric analysis of diploid ($n = 18$) and tetraploid forms in regard to the size of their pollen grains, it was found that colchicine-induced tetraploids, as well as the natural tetraploids, showed a bimodal curve in contrast to the diploids, which had only one mode.

2457 BARNARD, C.
The c-mitotic activity of cryptopleurine.
Aust. J. Sci. 1949 : **12** : p. 30.
Typical c-mitotic effects have been obtained by treating onion root tips with extracts of the following species: *Ervatamia angustifolia, Aristolochia elegans, Euphorbia Peplus, Bulbine bulbosa, Strychnos arborea, Gloriosa superba, G. vitiense, Crinum* spp. and *Cryptocarya pleurosperma*. Cryptopleurine, from the last-named species, gave the most interesting results. Its effects are briefly described; for cytological purposes the alkaloid is considered to be an excellent substitute for colchicine.

2458 DEYSSON, G.
Sensibilisation des tissus végétaux à l'action de la colchicine sous l'influence du ricinoléate de sodium. (**Sensitization of plant tissues to the action of colchicine using sodium ricinoleate**).
CR Acad. Sci. Paris 1946 : **223** : 433–34.
Sodium ricinoleate increases the c-mitotic effectivity of colchicine on *Allium Cepa* roots. Since the former substance is without c-mitotic effect, it is believed to act by increasing cellular permeability.

2459 DEYSSON, G. and LAYA, S.
Action mitoclasique de l'aminothiazol. (**The c-mitotic action of aminothiazol**).
CR Acad. Sci. Paris 1948 : **227** : 1112–13.
The c-mitotic effects of aminothiazol on *Allium Cepa* are described. A close connexion between c-mitosis and inhibition of cell division was noted.

2460 LEVAN, A. and VON WANGENHEIM, K. H. F.
Potassium cyanide in the *Allium* test.
Hereditas, Lund 1952 : **38** : 297–313.
A study was made of the cytological effects of different concentrations of KCN, using the *Allium* test method (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2365). Concentrations of 0·025 mol/l upwards had lethal effects, characterized by a strong alkaline dissolution of thick somatic material, swelling of resting nuclei, pycnotic divisions and despiralization. A c-mitotic zone of concentration occurred between 0·01 and 0·00025 mol/l. At concentrations of 0·0025 to 0·01 the c-mitoses were distinguished by a pronounced stickiness, resulting in pycnotic c-pairs; with the lower concentrations of this zone c-mitosis was fairly normal, at least during the initial period. Concentrations of 0·0001 to 0·000025 had c-tumour effects. Prolonged treatment sometimes led to c-mitosis, which is regarded as having a different mode of induction from the c-mitosis occurring within the second concentration zone. Below 0·000025 mol/l no visible disturbances in the cell were observed; with 0·00001 and lower concentrations root elongation proceeded normally.

MICROSCOPIC TECHNIQUE

2461 Hanson, A. A. and Oldemeyer, D. L.
Staining root-tip smears with aceto-carmine.
Stain Tech. 1951 : **26** : 241–42.

Methods of staining root tip smears with aceto-carmine were investigated, chiefly in grass species. A simplified technique for making chromosome counts is suggested.

2462 Davies, E. W.
Preservation of cytological material by storage at or below — 10° C.
Nature, Lond. 1952 : **169** : p. 714.

Anthers and sporangia of Gramineae, *Primula* and other plants, when fixed in 3 : 1 absolute alcohol: glacial acetic acid or 4 : 3 : 1 chloroform: absolute alcohol: glacial acetic acid, and stored in a deep-freeze Frigidaire at — 10° to — 14° C, have produced as good acetocarmine squash preparations after six months' cold storage as freshly fixed material.

2463 Nybom, N.
A device for facilitating the paraffin embedding procedure.
Hereditas, Lund 1952 : **38** : 248–50. (Abst.).

A method of illuminating from below the watch glass in which delicate and often almost invisible root tips and flower buds are being embedded in paraffin, and an invention for keeping the forceps, with which the material is arranged, quite warm by means of electricity are described.

*BOTANY

2464 Passecker, F.
Geschlechtsreife, Blühwilligkeit und Senilität bei holzigen Gewächsen. (**Sexual maturity, readiness to flower and senility in woody plants**).
Züchter 1952 : **22** : 26–33.

In woody perennials youth forms often occur before the periods of sexual maturity, flowering and fruiting are attained. Such forms are also found in many herbaceous plants, including crop plants, such as the potato. The special significance of the youth and the adult phases in fruit trees and other species is discussed with reference to methods of propagation, disease resistance, sexual maturity, aging in the individual tree and in clones, aging of vegetation points, and the environmental adaptation of the plant (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1123).

AGRICULTURE

2465 Ciclo de reuniones de coordinación e información técnica entre los servicios de investigación y los de extensión agrícola del Ministerio de Agricultura y Ganadería de la Nación. Información de la primera reunión realizada en la Estación Experimental Nacional de Pergamino, Provincia de Buenos Aires, durante los dias 13 y 14 de Junio de 1951. (**Series of meetings for technical coordination and information between the research and agricultural extension services of the Argentine Ministry of Agriculture. Report of first meeting held at the Pergamino National Experimental Station, Province of Buenos Aires, on 13 and 14 June 1951**).
Bol. Produc. Fomento Agríc. 1951 : **3** : No. 26 : 2–42.

The following papers of interest to plant breeders were read.

Serrano, H. Forrajeras. Resultados salientes de la experimentación en plantas forrajeras en Pergamino. (*Forage plants. Outstanding results of experimentation with forage plants at Pergamino*). (*pp. 8–16*).

Among the results referred to are the selection of a nematode-resistant lucerne with good agronomic qualities; an improved form of *Bromus catharticus* with uniform seed ripening; a good selection of *Lolium perenne* well adapted to local conditions; a selection of *Dactylis glomerata* with improved seed production; a form of *Phalaris tuberosa* with uniform ripening of seed and vegetative matter; a line of *Ph. minor* with greater leafiness and longer vegetative cycle; a line of black barley resistant to green aphids; and selections of *Sorghum almun* [*sic*] almost free from rhizomes.

Giordano, H. J. Trigo. 1. Comportamiento agrícola de variedades. Consejos de siembra. 2. Problemas del carbón hediondo. Discusión de los métodos de lucha. (*Wheat. 1. Agricultural behaviour of varieties. Advice for sowing. 2. Problems of bunt. Discussion of methods of control*). (*pp. 28–32*).

Some of the 18 wheat hybrids now under examination may have to be released prematurely on account of their resistance to *Puccinia*

* General studies, see also individual crops.

graminis if the attacks of this parasite should become still more serious. In the discussion, various speakers praised the variety Klein Cometa.

Kugler, W. F. and Marciote, C. V. Lino. 1. Comportamiento agrícola de las variedades. Consejos de siembra. Plagas y enfermedades. (*Linseed. 1. Agricultural behaviour of varieties. Advice for sowing. Pests and diseases*). (*pp. 33–36*).

The variety Charrúa MA has given good yields after growing for 14 successive years in wilt-infected soil; it is also immune to all races of flax rust found in Argentina. No variety is resistant to pasmo but the least susceptible are Klein II and Entre Ríos. The characteristics of these and other promising varieties are given.

2466 Nuttonson, M. Y.
Ecological crop geography and field practices of Japan. Japan's natural vegetation, and agro-climatic analogues in North America.
Amer. Inst. Crop Ecol. Wash. 1951: Pp. 213.

A very detailed study of agroclimatical conditions in Japan and their analogues in North America is added to the series of monographs on the ecological crop geography of various countries, published with the main purpose of facilitating plant introduction (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 2099, Vol. XX, Abst. 119 and Vol. XXI, Abst. 108).

*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

2467 Papazian, H. P.
Unordered tetrads.
Amer. Nat. 1952 : **86** : 117–18.

A solution is given to the following problem arising in the genetical investigation of micro-organisms: the calculation of the probability of obtaining two or more identical tetrads when n independent factors are involved and spores are collected in unordered tetrads.

2468 Muromcev, S. N.
(The problem of species formation in microorganisms).
Agrobiologija (Agrobiology) 1952 : No. 2 : 88–108 [Russian].

Changes in the environment and in the metabolic processes of microorganisms are regarded as the principal causes of variation within a species and conversion of some species into others.

2469 Moos, W. S.
Variation of irradiation effects on microorganisms in relation to physical changes of their environment.
J. Bact. 1952 : **63** : 688–90.

Experiments with *Escherichia coli* show that the number of bacteria surviving X irradiation at 3000 r. is increased fourfold by irradiating the bacteria in a dried state instead of in broth. The indirect action of radiation in producing lethal mutants is thus inhibited by dehydration.

2470 Jordan, D. C.
Studies on the legume root nodule bacteria. II. The production and behavior of colonial mutants produced by X-ray irradiation.
Canad. J. Bot. 1952 : **30** : 125–30.

Descriptions are given of four mutant forms of *Rhizobium trifolii* R_{20} and two mutants of R_{21} resulting from X irradiation at the Ontario Agricultural College. Although the colonial morphology of each mutant was maintained during serial transference on artificial media, considerable change was observed after inoculating Grimm lucerne with the bacteria; three mutants of R_{20} showed greater nitrogen fixing efficiency than the parent strain after two passages through tissues of this host.

2471 Perret, J.
Biochemistry and bacteria.
New Biology 1952 : No. 12 : 68–96.

Among the subjects briefly discussed are: the self perpetuation of genes; the relationship between genes and enzyme specificity; spontaneous, induced and directed mutations; response of the individual to environmental conditions; and differentiation with respect to the evolution of complex individuals from simpler organisms.

2472 Austrian, R.
Bacterial transformation reactions.
Bact. Rev. 1952 : **16** : 31–50.

Data supporting the view that desoxyribonucleic acids are the determinants of inherited characteristics in at least three species of bacteria are reviewed. The nucleic acid functions not only as a self-reproducing unit but also as the originator of cellular components necessary for bacterial transformations by which biochemical mutants arise.

* General studies, see also individual crops.

2473 McElroy, W. D. and Friedman, S.
Gene recombinations in luminous bacteria.
J. Bact. 1951 : **62** : 129–30.

Details are given of the aminoacid requirements of spontaneous mutants obtained from cultures of *Achromobacter fischeri*. The original cultures showed single biochemical deficiencies. Large numbers of unstable mutants requiring two aminoacids were isolated; these reverted readily to types with single deficiencies. Stable prototrophs exhibiting growth and luminescent characteristics similar to the wild type were also recovered, providing evidence in favour of the occurrence of recombination resembling that observed by Lederberg for *E. coli* (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 11).

2474 Hayes, W.
Genetic recombination in *Bact. coli* K 12: analysis of the stimulating effect of ultra-violet light.
Nature, Lond. 1952 : **169** : 1017–18.

In a previous paper it was postulated that a unidirectional transfer of genetic material from 58–161 to W 677 occurred, possibly through the agency of a symbiotic virus (cf. Abst. 1650). The living cells of the donor strain 58–161, it was suggested, extruded a metabolically inert gamete or gametes which adhered to the cell wall, so that the subsequent role of the cell in recombination was that of a passive carrier of its genetic elements, a function independent of viability. The stimulating effect of ultraviolet light upon recombination is restricted to the gene donor, 58–161. This differential effect upon 58–161 and W 677 may be due to increase in the proportion of 58–161 cells extruding potent gametes. The stimulation of the fertility of 58–161 may however be only secondary to the enhancement of phage liberation.

2475 Kann, E. E.
A liquid culture method for the study of genetic recombination in *Escherichia coli*.
J. Bact. 1952 : **63** : 421–22.

It is suggested that the described method involving the use of a liquid medium to assess quantitatively the occurrence of prototrophs in a mixture of two auxotrophic mutants of strain K–12 is more suitable than the agar method for studying the kinetics of recombination.

2476 Ryan, F. J.
Distribution of numbers of mutant bacteria in replicate cultures.
Nature, Lond. 1952 : **169** : 882–83.

The distributions of numbers of lactose-utilizing (*lac*$^+$) mutants among replicate cultures of two *lac*$^-$ strains of *Escherichia coli* are compared with the theoretical distributions calculated by the method of Lea and Coulson (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 792). Strain ML produced mutants according to their theory; strain K 12 did not however fit the theoretical distributions. Possible causes of this failure are examined. Failure to fit the Lea and Coulson distribution, it is concluded, is not sufficient evidence that the change being studied is not due to a randomly distributed mutation. Furthermore, in cases where the Lea and Coulson distribution is not followed, calculations of the mutation rate from numbers of mutants by the usual methods would be in error.

2477 Goodlow, R. J., Tucker, L., Braun, W. and Mika, L. A.
Effect of the isomeric configuration of the source of nitrogen on changes in population and metabolism in cultures of *Brucella*.
J. Bact. 1952 : **63** : 681–85.

In initially smooth cultures of *Brucella suis* grown in l-asparagine a mucoid mutant became established; this mutant differed from the rough mutant observed after growth in d-asparagine or dl-asparagine. Preliminary tests show that valine, accumulating in the l-asparagine medium at the time of establishment of the mucoid mutant, may influence population changes in a manner similar to the selective action of alanine during growth in d-asparagine (cf. Abst. 105).

2478 Rowley, D.
Selection of penicillin-sensitive mutants of *Escherichia coli* following ultraviolet irradiation.
J. Gen. Microbiol. 1952 : **6** : 272–77.

Five mutants over 10 times more sensitive to penicillin than the parent strain K 12 were isolated, following exposure of the latter to ultraviolet irradiation.

2479 Mudd, S. *et al.*
Further evidence of the existence of mitochondria in bacteria.
J. Bact. 1951 : **62** : 729–39.

Cytoplasmic granules in cells of the wild type of *Saccharomyces cerevisiae* and in *Escherichia coli* B, *Micrococcus cryophilus* and *Bacillus megatherium* are shown to reduce tetrazols, oxidize the Nadi reagent and give a sequence of colour changes with Janus green B characteristic of mitochondria.

2480 Boivin, A., Tulasne, R. and Vendrely, R.
Localisation et rôle des deux acides nucléiques chez les bactéries; le problème du noyau bactérien. (Localization and role of the two nucleic acids in the bacteria; the problem of the bacterial nucleus).
CR Acad. Sci. Paris 1947 : **225** : 703–04.
Histochemical investigations have located ribonucleic acid in the cytoplasm and desoxyribose nucleic acid in a central nucleus. The latter body, it is suggested, is a single chromosome, The diploid phase, inferred on genetical grounds, is believed to permit of crossing over but to be of only short duration.

2481 De Lamater, E. D. and Hunter, M. E.
The nuclear cytology of sporulation in *Bacillus megaterium*.
J. Bact. 1952 : **63** : 13–21.
Observed nuclear activities indicate that sporulation is a strictly vegetative process; the last division prior to spore formation is mitotic and the resulting spores are haploid. Affinities are suggested between this process and spore formation in fungi which produce haploid spores to propagate the vegetative phase; sexual reproduction in such fungi is unconnected with sporulation. Further evidence that nuclear fusion and reductional division are processes distinct from sporulation is being sought in *B. megaterium*.

2482 Hunter, M. E. and De Lamater, E. D.
Observations on the nuclear cytology of spore germination in *Bacillus megaterium*.
J. Bact. 1952 : **63** : 23–31.
When the spore becomes reorganized from its resting phase the first division is mitotic and this is followed by normal vegetative reproduction; this illustrates the haploid continuity between vegetative phases before sporulation (cf. Abst. 2481) and after germination.

2483 Davis, B. D.
Biosynthetic interrelations of lysine, diaminopimelic acid, and threonine in mutants of *Escherichia coli*.
Nature, Lond. 1952 : **169** : 534–36.
Observations on several mutants suggest that in *E. coli* diaminopimelic acid functions not only as a structural component of the cell but also as a precursor of lysine. As shown by other investigators, lysine synthesis in *Neurospora crassa* takes place by a different process. Possibly lysine synthesis via diaminopimelic acid has a selective advantage over the alternative process only when diaminopimelic acid is also required as a structural component.

2484 Ravin, A. W.
Heritable and non-heritable loss of ability by *Aerobacter aerogenes* to grow adaptively on single carbon sources.
J. Gen. Microbiol. 1952 : **6** : 211–32.
Spontaneously occurring genetic mutants incapable of utilizing citrate have been recovered from glucose cultures of a wild type strain of *Ae. aerogenes*; these mutants maintained their stability over 26 generations. They are also unable to utilize α-ketoglutarate, glutamate, succinate, fumarate, aspartate and acetate, to which the wild type cultured in glucose becomes slowly adapted. The similarity between these mutants and strains of *Escherichia coli* which cannot utilize citrate is emphasized, with reference to evolution of new species by biochemical mutations.
Other forms showing inability to respond to media containing citrate after being grown on a glucose substrate for some time do not transmit this physiological modification to their progenies (cf. Abst. 2485).

2485 Ravin, A. W. and Norman, A.
Studies on a non-heritable physiological modification in *Aerobacter aerogenes*.
Experientia, Basel 1952 : **8** : 108–10.
Further studies on nonheritable modifications with respect to the utilization of citrate as the sole source of carbon (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1627) were carried out at the Department of Zoology, Columbia University; observations on the reaction of initially homogeneous cultures to substrates containing α-ketoglutarate, succinate, fumarate or acetate as the sole carbon constituent were included. Loss of ability to grow in media containing citrate was shown to be distinct from the stable genetic mutation occurring spontaneously at low frequency in glucose cultures of *Ae. aerogenes*. Whereas these genetic mutants maintain their stability over several generations, the strains which show heterogeneity with respect to ability to respond to media containing citrate after being grown in an unaerated glucose substrate for some time do not transmit their physiological alteration.
Heterogeneous cultures inoculated into fresh glucose medium became homogeneous in a period too brief for the operation of natural selection. An auxotrophic prolineless mutant

was used to show that restoration of homogeneity is correlated with the active metabolism of the heterogeneous population; absence of proline in the medium reduced the rate of restoration.

Homogeneous populations of *Ae. aerogenes* inoculated into filtered media of heterogeneous cultures became heterogeneous, suggesting that substances existing in the media are responsible for inducing the nonheritable adaptation.

Data on the average number of units per cell whose inactivation would theoretically result in the inability to grow in a certain medium agree with counts of the average number of nuclei per cell; thus it appears that the nonheritable loss of ability to grow in media containing specific carbon sources may be due to nuclear inactivation.

2486 Englesberg, E.
The mutagenic action of formaldehyde on bacteria.
J. Bact. 1952 : **63** : 1–11.

A high frequency of mutations from the wild type *Pseudomonas fluorescens* A 3·7 to a mutant form capable of using itaconic acid (methylene succinic acid) as a source of carbon, and from phage susceptible *Escherichia coli* B to a mutant possessing resistance to phage T1, was observed after exposure to 0·1% formaldehyde for 15–20 mins. It is suggested that formaldehyde, an intermediary compound in the metabolism of glycine and sarcosine, may be concerned with the occurrence of mutations hitherto termed spontaneous.

2487 Voureka, A.
Induced variations in a penicillin-resistant staphylococcus.
J. Gen. Microbiol. 1952 : **6** : 352–60.

A strain of *S. aureus* treated with either chloramphenicol, terramycin, nitrogen mustard or hydrogen peroxide produced many nonviable progeny; surviving offspring were less virulent than the parent strain and showed decreased resistance to penicillin and streptomycin. It is therefore assumed that the injurious treatments may have induced genetical mutations.

2488 Hollis, J. P.
Studies on *Streptomyces scabies*. I. Variability in a melanin-indicator medium.
Phytopathology 1952 : **42** : 273–76.

Three types of colonies developed when the parent culture was assayed on a minimal tyrosine medium supplemented with yeast extract: (1) small colonies strongly melanogenic, designated type A; (2) large type B colonies with weak melanin-diffusion zones; and (3) albino type C colonies. Both A and B gave rise to C colonies by mutation, with a frequency of 0·2 to 1% of the total number of colonies assayed.

2489 Newcombe, H. B. and McGregor, J.
On the nonadaptive nature of change to full streptomycin resistance in *Escherichia coli*.
J. Bact. 1951 : **62** : 539–44.

An addition of 32 units per ml. of streptomycin to cultures of *E. coli* B/r has an appreciable effect on the mutation rate from partial streptomycin resistance to full streptomycin resistance. However, a similar increase in the mutation rate to phage T 1 resistance, a change unrelated to mutations affecting streptomycin response and involving genes at some distance from the locus determining reaction to streptomycin, was also detected in the presence of streptomycin.

When sensitive and resistant lines of *E. coli* K 12 are crossed, the offspring which are not fully resistant show variable degrees of partial resistance, indicating that the resistant parent contributed not only the gene for full resistance but also mutant alleles of other loci capable of producing partial resistance.

2490 Page, L. A., Goodlow, R. J. and Braun, W.
The effects of threonine on population changes and virulence of *Salmonella typhimurium*.
J. Bact. 1951 : **62** : 639–47.

The increased virulence of *S. typhimurium* after inoculation into guinea pigs injected simultaneously with DL-threonine was found to be due to the *in vivo* selection of a spontaneously occurring threonine resistant mutant, designated S^t to distinguish it from the original threonine susceptible S^o strain. S^t mutants also became rapidly established in formerly S^o populations *in vitro* when threonine was added to the medium. S^t colonies appeared transparent in oblique lighting, contrasting with the opaque character of the original strain.

2491 Sevag, M. G. and Rosanoff, E. I.
Mechanism of the development of resistance to streptomycin. I. Origin of resistant strains.
J. Bact. 1952 : **63** : 243–51.

A differential technique is described which permits demonstration of the presence of one or more streptomycin resistant cells in a large population of sensitive cells of *Micrococcus*

pyogenes var. *aureus*. Sensitive cells fail to grow in aminoacid deficient medium containing 10μ grm. of streptomycin per ml. After growth on a complete aminoacid medium containing streptomycin, they are able to grow in aminoacid deficient medium containing 100μ grm. of streptomycin per ml. Thus it appears that there are no spontaneous streptomycin resistant mutants in the original population; it is only after exposure to streptomycin, in a medium complete with respect to glucose and aminoacids, that streptomycin resistance is induced.

2492 Saz, A. K., Eagle, H. and Toal, J. N.
The effect of ultraviolet irradiation on the development of resistance of bacteria to antibiotics.
J. Bact. 1952 : **63** : 513–23.

Contrary to expectations (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1585), irradiation of *Micrococcus pyogenes* var. *aureus* did not induce increased resistance to either penicillin or streptomycin. After treatment the bacteria showed an initial sensitivity to the antibiotics which persisted for up to 4 hours following irradiation. Increased resistance to streptomycin was, however, observed in irradiated cultures of *Escherichia coli*; the increased resistance became apparent after 11 generations and occurred only in a restricted range of streptomycin concentration.

2493 McVeigh, I. and Hobdy, C. J.
Development of resistance by *Micrococcus pyogenes* var. *aureus* to antibiotics; morphological and physiological changes.
Amer. J. Bot. 1952 : **39** : 352–59.

M. pyogenes var. *aureus* FDA 209 P became increasingly resistant to penicillin, chloromycetin, aureomycin, dihydrostreptomycin and subtilin when cultured in increasing concentrations of the individual antibiotics. The rate at which resistance developed and the degree of resistance attained varied with each antibiotic; one strain adapted to penicillin was 8 times more resistant to that substance than the parent strain. All adapted strains showed changes in morphology; cells were enlarged and grew more slowly than the original bacteria. With increased adaptation to penicillin the bacteria became pleiomorphic, numerous physiological and biochemical characteristics were lost and the Gram stain reaction became negative; although most strains adapted to antibiotics showed reversion to antibiotic sensitivity when cultured in media free from antibiotics, the strains adapted to penicillin and aureomycin showed no reversion.

2494 Eagle, H., Fleischman, R. and Levy, M.
Development of increased bacterial resistance to antibiotics.
J. Bact. 1952 : **63** : 623–38.

It is suggested that a slightly enhanced resistance, following exposure to relatively low concentrations of antibiotic, develops by a process of adaptation, while the few highly resistant colonies formed at high concentrations arise as spontaneous mutations (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1622).

2495 Braun, W., Goodlow, R. J., Kraft, M., Altenbern, R. and Mead, D.
The effects of metabolites upon interactions between variants in mixed *Brucella abortus* populations.
J. Bact. 1951 : **62** : 45–52.

The results of analyses of factors determining the attainment of equilibria between a smooth clone of *B. abortus* (2583 S) and a rough clone (7748 R) at least five times more resistant to alanine than the smooth variant are summarized (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1617). In a mixed culture having an initially high proportion of alanine sensitive S individuals capable of rapid alanine production, the proportion of R types increases as their alanine resistance provides them with a high selective value. Conversely, if a mixed culture has an initially high proportion of R cells with a low rate of alanine production, the number of S types increases at the expense of the resistant cells since, in the absence of high alanine concentrations, selection favours the more sensitive individuals.

2496 Dulbecco, R.
A critical test of the recombination theory of multiplicity reactivation.
J. Bact. 1952 : **63** : 199–207.

Survival curves for phage production by *Escherichia coli* B infected with phage T2, previously inactivated by ultraviolet light, have been determined for a wide range of ultraviolet doses (2537 Å for 70 to 700 secs.), with and without photoreactivation. At high ultraviolet dosage the results are not compatible with the recombination theory which postulates that reactivation is due to simple recombination of undamaged units, from several parental particles, to form active and complete particles; this theory was orginally based on data obtained

from treatment with low ultraviolet dosage (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2436).

2497 Dulbecco, R.
Mutual exclusion between related phages.
J. Bact. 1952 : **63** : 209–17.

Experiments have shown that the nucleic acid of phage T2r is broken down by *Escherichia coli* B already infected with phage T2r+ if the time interval between primary infection and superinfection is more than one minute; genetic markers which might be contributed by phage T2r are completely excluded from the bacteriophages liberated at the subsequent lysis. Phage T2 irradiated with ultraviolet light at 2537 Å for 380 secs. also effects the exclusion of superinfecting phages at the same rate as does active phage under similar conditions. When the bacterium is infected simultaneously with active and irradiated viruses, neither is excluded. If both primary and superinfecting phages have been irradiated by ultraviolet light, both may become reactivated under favourable conditions; the ability of the superinfecting phage to cooperate with the primary phage, thus producing progeny bearing genetic markers from both parents, decreases at the same rate as that at which the stimulation to exclusion occurs.

2498 Lederberg, J. and Lederberg, E. M.
Replica plating and indirect selection of bacterial mutants.
J. Bact. 1952 : **63** : 399–406.

A method by which a pattern of small bacterial colonies can be copied from an initial agar plate on to a series of others without disturbing spatial relationships is described. This technique had been used to demonstrate the clonal occurrence of adaptive biochemical mutants prior to their selection by specific environments. Several replicas from a plate of *E. coli* K–12, sensitive to phage T1 and streptomycin, were made on agar containing bacteriophage or streptomycin. Mutants resistant to phage or streptomycin were detected at superimposable sites on each plate, indicating that resistant cells were already present at definite sites on the initial plate.

It was possible to remove bacteria from sites thus shown to contain mutants; after only a few cultural transfers each type of resistant mutant was obtained as a pure culture.

Since the procedure at no time exposes the initial population to a specific phage or streptomycin, these observations confirm previous evidence for the occurrence of spontaneous mutation and selection during heritable adaptation to new environments.

2499 Freeman, V. J. and Morse, I. U.
Further observations on the change to virulence of bacteriophage-infected avirulent strains of *Corynebacterium diphtheriae*.
J. Bact. 1952 : **63** : 407–14.

The ability to obtain virulent *C. diphtheriae* cultures from single cell subcultures of avirulent strains of *C. diphtheriae*, when the avirulent strains were exposed to diphtheria bacteriophage, was demonstrated in all subcultures of two avirulent phage susceptible strains. Thus a suggestion that the avirulent cultures used in previous experiments (cf. Abst. 948) might have contained a small number of virulent cells no longer needs consideration.

2500 Clarke, N. A. and Cowles, P. B.
Studies on the host-virus relationship in a lysogenic strain of *Bacillus megaterium*. I. The relationship between growth and bacteriophage production in cultures of *B. megaterium*.
J. Bact. 1952 : **63** : 177–86.

The rate of reversion from phage resistance to virus sensitivity was calculated to be 2% in a culture of the lysogenic strain *B. megaterium* 899. Since the majority of cells carry bacteriophages, or their precursors, but fail to liberate them, it is suggested that these cells should be termed lysophoric; the term lysogenic should be applied to the culture as a whole or to those cells which burst, liberating free viruses.

2501 Clarke, N. A.
Studies on the host-virus relationship in a lysogenic strain of *Bacillus megaterium*. II. The growth of *B. megaterium* in synthetic medium.
J. Bact. 1952 : **63** : 187–92.

Although the rate of reversion to phage sensitivity in *B. megaterium* 899 is fairly high (cf. Abst. 2500), in broth culture the sensitive cells are selectively destroyed by bacteriophages, and thus fail to outnumber their resistant parents. When transferred to a synthetic Ca^{++} free medium, however, the bacteriophages were eliminated and a completely phage sensitive culture developed in a short time.

2502 Lwoff, A.
Lysogenic bacteria, I.
Endeavour 1952 : **11** : 72–77.

The characteristics of lysogenic bacteria are discussed, with details of techniques used to

isolate individuals and study the liberation of bacteriophages. Data indicate that in populations of nonlysogenic phage sensitive bacteria there are always immune mutants into which the bacteriophages penetrate and are transformed to nonpathogenic probacteriophages. Back mutations from immunity to sensitiveness occur spontaneously, allowing the perpetuated probacteriophages to develop into bacteriophages; some of the mutants are then lysed and others reproduce to perpetuate a new lysogenic strain. Bacteriophage immunity is therefore equivalent to lysogenesis.

2503 Papazian, H. P.
The analysis of tetrad data.
Genetics 1952 : **37** : 175–88.

Information derived from analyses of fungal tetrads is reviewed to show methods of mapping the positions of paired loci and centromeres. Irregular recombination frequencies are discussed, with reference to the effects of an increase or decrease in total crossing-over on chiasma and chromatid interference.
A convenient statistical method, devised by Savage, is applied to the estimation of interference using data from numerous crosses.

2504 Christensen, C. M., Stakman, E. C. and Christensen, J. J.
Variation in phytopathogenic fungi.
Ann. Rev. Microbiol. 1947 : **1** : 61–84.

The range of physiological and morphological variants within a species is illustrated by referring particularly to variation among rusts and smuts. New races, originating by mutation, reassortment of heterocaryotic nuclei and hybridization, necessitate thorough and continual testing of breeding material under artificially created epidemic conditions; reference is made to collections of physiological races of *Phytophthora infestans* in Europe and *Puccinia graminis* var. *Avenae* in the USA used to ascertain the resistance of new varieties of potato and oats respectively.
The need for careful examination of plant introductions during a period of quarantine is also stressed in an attempt to restrict the distribution of many newly evolved races of pathogens.

2505 Maxwell, M. E.
Enzymes of *Aspergillus oryzae*. II. The yield of enzymes from mutants produced by ultraviolet irradiation.
Aust. J. Sci. Res. 1952 : Ser. B. : **5** : 56–63.

On the bases of changes in dry weight of mycelium, rate of production of conidia and quantity of protease and esterase produced, 60 stable mutants obtained after irradiating conidia of *A. Oryzae* at five different wave lengths are divided into five groups. Most of the lethal mutations were induced by 2650 and 2804 Å; the former wave length gave rise to the largest number of mutants. Strains showing most obvious differences from the original occurred with greatest frequency after irradiation at 2804 Å.

2506 Feniksova, P. V. and Dvadcatova, E. A.
(Producing new races of moulds with intensified capacity for breaking down starch).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1952 : No. 2 : 56–65. [Russian].

A new race of *Aspergillus niger*, A–1, with a greater capacity for breaking down starch than the initial mould has been obtained by culturing *A. niger* upon the cell juice of *A. Oryzae*.

2507 Jinks, J. L.
Heterocaryosis in wild *Penicillium*.
Hereditas 1952 : **6** : 77–87.

From each of 14 isolates of the *Asymmetrica* group under observation at Birmingham University (England) two types of colony were produced, each developing from a single uninucleate spore. Colonies resembling the original strains were resynthesized when spores from the segregating types were grown together, thus indicating the occurrence of heterocaryotic nuclear association. There is evidence that, in the wild state, uninucleate spores adhere during dispersal so that the heterocaryon is maintained. The adaptive significance of the heterocaryotic state is discussed and compared with the advantages of hybridity in sexually reproducing species.

2508 Hemmons, L. M., Pontecorvo, G. and Bufton, A. W. S.
Perithecium analysis in *Aspergillus nidulans*.
Heredity 1952 : **6** : p. 135. (Abst.).

A new technique of perithecium analysis, using genes controlling colour of conidia as markers, has revealed that many perithecia developing on plates seeded with ascospores from several strains contain asci derived from association between two heterothallic hyphae. When growing alone under normal conditions each of the strains is self fertile, but in 10 of 22 possible crosses investigated the proportion of asci resulting from heterocaryogamy approached

100%; this indicates that heterocaryotic associations may be preferential.

2509 Kølmark, G. and Westergaard, M.
Validity of the *Neurospora* back-mutation test.
Nature, Lond. 1952 : **169** : p. 626.

Recently Grigg criticized the assay method generally used to detect reverse mutants of *Neurospora* induced by radiation, on the grounds that conidia of the wild type are inhibited by various concentrations of the mutant strains (cf. Abst. 1678). The present authors regard this criticism as invalid; they find that the inhibition observed by Grigg occurs only on a sorbose medium but not on the standard glucose medium which has been used exclusively in the back mutation experiments.

2510 McElroy, W. D., Cushing, J. E. and Miller, M.
The induction of biochemical mutations in *Neurospora crassa* by nitrogen mustard.
J. Cell. Comp. Physiol. 1947 : **30** : 331–46.

During an investigation of the mutagenic effects of bis-β-chloroethylmethylamine on various stages in the life cycle of *N. crassa* it was found that actively growing cells containing dividing nuclei are most sensitive. Conidia 7–15 days old proved relatively resistant to treatment, whereas a high rate of mutation was recorded in conidia 2–3 days old. An observed mutation rate of 8·5% resulted from treatment of protoperithecia.
A comparison of mutation rates suggests that nitrogen mustard is a more effective mutagenic agent for *N. crassa* than either ultraviolet light or X rays.

2511 Roberts, C.
A comparative study of *Torulopsis pulcherrima* and *Taphrina deformans* in culture.
Farlowia, Cambridge, Mass. 1946 : **2** : 345–83.

The occurrence and transmission of cultural variants have been investigated in both organisms; *Torulopsis pulcherrima* regularly produces a single variant, whereas *Taphrina deformans* sporadically produces two mutant forms. In conjunction with differences in type of pigmentation and fermentative ability, these variants constitute the main differences between the two organisms which are otherwise structurally and physiologically similar when grown in culture. Removal of *Torulopsis pulcherrima* from the imperfect yeasts to the Taphrinales is discussed.

2512 Saenko, G. N. and Kotljarenko, M. P.
(Pure yeast cultures in wine making by the Massandra trust).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. **4** : 17–20. [Russian].

New active strains of *Saccharomyces ellipsoideus*, Sudak VI–5, Feodosija I–19 and Sudak II–9, have been selected at the Magarač institute.

2513 Winge, Ö.
The basis for the present position of yeast genetics.
Wallerstein Laboratories Communications 1952 : **15** : No. 48 : 21–44.

Advances made in cytogenetical research on yeasts during the past 16 years are summarized. Aspects reviewed include: alternation of generations; segregation of different types from a single ascus; artificial intervarietal and interspecific hybridization; occurrence of simple Mendelian segregation; discovery of mating types; inheritance of fermentative characteristics and capacity for flocculation, involving polymeric genes; polyploidy; and mutation studies.
Reference is made briefly to the prevailing disagreement between the Lindegren school and others.

2514 Luteraan, P. J. and Dieng, F.
Mutations provoquées par action directe ou indirecte sur la partie caroténoide de l'insaponifiable des organismes fongiques.
(Mutations induced by direct or indirect action on the carotenoids of the insaponifiable fraction of some fungi).
CR Acad. Sci. Paris 1948 : **226** : 1032–34.

Mutations affecting pigmentations have been induced in *Rhodotorula* and *Saccharomyces* by menthol and terpineol, and by highly oxygenated water, but not by sterols.

2515 Kvasnikov, E. I.
(The USSR conference on microbiology).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. **1** : 56–58. [Russian].

Summaries of the following reports, read at the 1951 conference, are included:—

Imšeneckiĭ, A. A.
The Mičurinite principle of the inheritance of

acquired characters is accepted and formal genetics, metaphysics, idealism and the theories of cyclogeny and dissociation are rejected. Directed training of phasically young adapted microorganisms is regarded as a more efficacious breeding method than selection.

Ierusalimskiĭ, N. D.
External conditions help to improve and fix required properties in microorganisms.

Muromcev, S. N.
Conversions of individuals of one species into those of another are regarded as the main source of development of new species.

Timakov, V. D.
Changes of species of microorganisms into other species have been obtained.

Meĭselj, M. N.
Methods involving the use of toxic substances and irradiation to induce mutations in microorganisms can be efficacious, although normally they produce pathological forms with abnormal metabolic processes.

Kosikov, K. V.
Saccharomyces globosus has been trained to ferment sucrose.

Kvasnikov, E. I.
Extensive changes have been obtained in yeasts by inoculating the cultures with other microorganisms or their filtrates. The latter method is designated vegetative hybridization. Mutual relations between yeasts and lactic acid bacteria have been studied. Several races of yeasts have been bred by these methods and introduced into the wine industry.

Loginova, L. G.
A new race of *Saccharomyces cerevisiae*, capable of development at 40° C, has been obtained by training.

Kirjjalova, D. N.
New races of yeasts for making fruit wines have been introduced. The breeding method consisted of cultivating several different species of yeasts in the same culture. This had the effect of changing the properties of the species involved.

Feniksova, R. V.
New races of *Aspergillus niger* with intensified power of breaking down starch have been introduced. They were obtained by culturing the fungus upon the cell juice of *A. Oryzae*.

2516 Kosikov, K. V.
(Directed variability in the enzymic properties of yeasts obtained with preparations from related strains).
Doklady Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **73** : 381–84. [Russian].
Several strains of *Saccharomyces globosus* and hybrids between *S. globosus* and *S. ellipsoideus* became capable of fermenting sucrose when filtrates of races which fermented sucrose were introduced into their nutrient cultures.

2517 Saraswathy Royan and Subramaniam, M. K.
Critical evidence for somatic doubling of chromosomes in a top yeast.
Nature, Lond. 1952 : **169** : p. 932.
Spontaneous doubling of the chromosome number has been detected in the top yeast strain BY2. Somatic doubling of the chromosome number is only one of the conditions necessary for the production of stable tetraploids. A gene mutation which renders the duplicated set of chromosomes capable of harmonious functioning appears to be essential for the stabilization of tetraploidy.

2518 Duraiswami, S.
Physiological consequences of polyploidy in yeasts. III. Influence of alcohol on the glucose metabolism of the diploid and autotetraploid brewery yeasts.
J. Indian Inst. Sci. 1952 : **34** : 107–17.
It has previously been found that tetraploid yeast shows an increase in the rate of fermentation but produces the same percentage of alcohol, compared with the diploid (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1481 and Vol. XXII, Abst. 1691). The present paper describes experiments on the fermentative behaviour of the 4*n* and 2*n* strains under various physiological conditions. The actual percentage of glucose metabolized at any given concentration of alcohol was higher in the case of the tetraploid; this disparity was however only due to the difference in fermentative capacity of the two forms and did not imply a higher alcohol tolerance in the tetraploid. Storage for various periods had different effects upon the fermentative behaviour of the 4*n* and 2*n* strains.

2519 LINDEGREN, C. C. and PALLERONI, N. J.
Absence of the pre-adaptive utilization of galactose by yeasts.
Nature, Lond. 1952 : **169** : 879–80.

Experiments are described which have indicated that the immediate oxidation which occurs when certain samples of galactose are mixed with yeast is due to impurities present in the galactose, and that these impurities may act as a source of energy which facilitates the initiation of adaptation to galactose fermentation. With some strains, the endogenous metabolism provides sufficient energy for adaptation even when purified galactose is used; the preadaptive period is however prolonged relative to that occurring when commercial galactose is used. These results do not agree with the theory of Reiner and Spiegelman that preadaptive oxidation of galactose occurs in yeasts incapable of fermenting galactose and in unadapted strains.

2520 WINGE, Ö. and ROBERTS, C.
The relation between the polymeric genes for maltose, raffinose, and sucrose fermentation in yeasts.
CR Lab. Carlsberg, Copenhagen 1952 : **25** : 142–71.

Previous work by Gilliland on hybrids between *Saccharomyces Chevalieri* and *S. italicus* indicated that the former species possesses three polymeric genes for raffinose and sucrose fermentation, designated R_1, R_2 and R_3 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 813). The present paper describes back-crossing experiments which successfully isolated these three genes in their respective types. The gene pair R_1r_1 was closely linked with M_1m_1, with a crossing-over percentage of approximately 1·3. M_2 was responsible for the fermentation of maltose only and thus conditioned maltase synthesis. M_1 controlled the fermentation of both maltose and sucrose; the suggestion of Gilliland that this gene determines the synthesis of α-glucosidase was therefore confirmed.

2521 WICKERHAM, L. J. and BURTON, K. A.
Occurrence of yeast mating types in nature.
J. Bact. 1952 : **63** : 449–51.

During routine isolation of yeasts it has been observed that some species exist predominantly as haploids. Many of these forms, previously thought to be nonsporogenous, have however produced ascospores when cultured with certain other haploids; thus it appears that they are heterothallic mating types geographically isolated in nature. It is pointed out that, under prevailing rules of nomenclature, those types which have proved to be heterothallic forms of the same organism can no longer be retained as separate nonsporogenous species.

2522 PEYNAUD, É. and RIBEREAU-GAYON, J.
Sur les divers types de fermentation alcoolique determinées par diverses races de levures elliptiques. (**On the different types of alcoholic fermentation brought about by different races of elliptic yeasts**).
CR Acad. Sci. Paris 1947 : **224** : 1388–90.

Different yeast strains from various vine-growing regions of France were shown to differ in the proportions of acetic acid, succinic acid and butylene glycol in sterile grape juice. The proportions of these substances are believed to play an important part in contributing to the characteristic flavour of the wines from the areas concerned.

2523 GENEVOIS, L., PEYNAUD, É. and RIBEREAU-GAYON, J.
Action du milieu sur les produits secondaires de la fermentation alcoolique des levures elliptiques. (**The action of the environment on the secondary products of the alcoholic fermentation of elliptic yeasts**).
CR Acad. Sci. Paris 1948 : **226** : 126–28.

In continuation of earlier work (cf. Abst. 2522), data are presented on the proportion of secondary fermentation products resulting from inoculating various yeast strains into sucrose solution.

2524 DENNIS, R. W. G.
Biological races and their taxonomic treatment by mycologists.
Proc. Linn. Soc. Lond. 1952 : **163** : 47–53.

The range of physiological variation among forms of *Puccinia* and *Ustilago* is discussed with reference to the system of numbering morphologically indistinguishable races.

2525 GUYOT, L. and MASSENOT, M.
Dix ans d'expérimentation (1941–1950) sur la rouille noire des céréales. [**Ten years' experiments (1941-1950) on the black rust of cereals**].
CR Acad. Agric. Fr. 1952 : **38** : 86–92.

The incidence of the four types of *Puccinia graminis* on wheat, barley, oats, rye and

various meadow grasses is recorded, with observations on specialization of the different forms of the black rust fungus (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 2432 and 2433). Varietal resistance and susceptibility in wheat are discussed with special mention of the highly resistant GN and GP complex hybrids which are immune to biotypes 14A, 15β, 17 and 21, very resistant to 14α and 14β, and moderately susceptible only to 15α. Both hybrids are being used as parents in breeding for black rust resistance at Grignon (cf. Absts. 1809 and 1817). *Triticum Timopheevi* has been found susceptible to races 14, 15, 17 and biotype 15α by experimental contamination in the greenhouse, but its field resistance as it reaches maturity is very good.

2526 KUNKEL, L. O.
Variation in phytopathogenic viruses.
Ann. Rev. Microbiol. 1947 : **1** : 85–100.

A general survey of mutant forms of viruses indicates that the rate and extent of mutation are specific for most viruses. Tobacco and cucumber mosaic viruses show much greater variation than those causing peach rosette or potato leaf roll.

INSECTICIDES

2527 TOXOPEUS, H. J.
Studies in the breeding of *Derris elliptica* and *Derris malaccensis*.
Euphytica, Wageningen 1952 : **1** : 34–42.

An account is given of the history of the establishment of derris as a plantation crop in Indonesia. The number of morphologically different types of cultivated derris in Sumatra and Java and the adjacent islands is small; information is given on their distribution and possible origin. The rotenone content of all six clonal types analysed at Bogor, Java, was high. The types however differed markedly in rotenone content. Scope for improvement of rotenone production undoubtedly exists, especially in view of the fact that plants taken into cultivation from the wild population were selected only for the potency of their roots. Variation in wild populations has been surveyed. The roots of all samples analysed were very low in active constituents. The past and present occurrence of wild plants bearing roots with high potency is discussed with reference to the origin of cultivated types. Mention is made of a study of the possibility of using wild forms in breeding for disease resistance.

CROP PLANTS

2528 **The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland 1951** : Pp. 136.

Wilson, E. V. B. and Hodges, D. J. Spring oat variety trial, 1950. (*pp. 75–79*).

Under conditions of heavy rainfall at Muckamore, Co. Antrim, the Welsh oat S 225 showed greater resistance to lodging than the four other varieties on trial or the locally developed control, Stormont Iris; it did not, however, approach Sun II, Abed Minor or S 84 in either yield or quality of grain or straw. The results indicate that the Irish bred varieties Glasnevin Triumph and Stormont Iris are not suitable for parts of Northern Ireland where high rainfall makes lodging the controlling factor. Both Sun II and Abed Minor are recommended where lodging is expected.

Wilson, E. V. B. Flax variety trial, 1950. Analysis of processing data. (*pp. 80–86*).

In trials conducted at the Stormont Plant Breeding Station, only the Stormont selection Tx. 1 gave yields of scutched fibre approaching the outstanding yields of the standards Stormont Gossamer L 26 and Liral Prince; the grading value of Tx. 1 was, however, much lower than either standard.
Data suggest that Hollandia and Percello are less suited to the climate of Northern Ireland than to conditions in the Netherlands.

Reports from the research divisions for 1950. (*pp. 87–136*).

Trials on varieties of oats (cf. Abst. 317), barley, fodder beet and potato (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2815) are reported.
Oats. A number of selections from Stormont Arrow x Elder combine lodging resistance with good quality straw and grain. Numerous hybrid progenies from this and other crosses are under observation.
German land varieties are being used in crosses with local strains in an attempt to introduce tolerance of soils deficient in manganese.
Local strains have also been crossed with the mildew resistant oat Red Algerian.
Forage grasses. Selection is in progress among single ear progenies from local strains of *Lolium perenne*. A collection of potentially valuable breeding material has been made for an investigation of the inheritance of resistance to blind seed disease (*Phialea temulenta*).
Potato. The reactions of 10 seedling varieties

to viruses A, B and X were determined; Clarke's Seedling B 72 showed field immunity from virus X.

Flax. Breeding for resistance to *Fusarium Lini* has continued; some 30 new strains of flax have undergone field and greenhouse tests during the past season.

A programme of back-crossing has been started, using as the nonrecurrent parent a South American linseed type with resistance to seedling blight (*Colletotrichum linicola*), foot rot (*Phoma* spp.), browning (*Polyspora Lini*) and both the uredospore and teleutospore stages of rust (*Melampsora Lini*); the recurrent parent is a selection with good fibre quality and stiff straw, possessing resistance to the uredospore stage of *M. Lini* and immunity from the teleutospore phase.

2529 **Second Annual Report of the British Society for the Promotion of Vegetable Research, at the National Vegetable Research Station, Wellesbourne, Warwick 1951** (1952): Pp. 83.

Boyes, D. Plant breeding report. (*pp. 8–9*).

Breeding continued mainly at Cambridge, England, but work was initiated at the National Vegetable Research Station, Wellesbourne, Warwickshire. Propagation of varieties and breeding material of Brussels sprouts, winter cauliflower, cabbage, onions and peas was carried out.

Progenies derived from crosses between plants of different Cambridge varieties of sprouts have proved superior to either of the parent varieties involved. Single hybrids have given a better performance than progenies from double hybrids; the latter were slightly better than the parents. Selection of Roscoff winter cauliflower was undertaken at Bromwich Farm, Hampshire.

Parkinson, A. H. Experiments on vegetative and reproductive growth of cauliflower. (*pp. 38–51*).

The effects of different photoperiods, low temperature, high temperature, pot size and other factors upon vegetative and reproductive growth in the cauliflower varieties Pioneer (early), All-the-Year-Round (midseason and general) and Novo (late) were analysed. The possible application of some of the results to breeding is indicated.

Spencer, D. M. Watercress investigations. (*pp. 61–68*).

In a study of crook root fungus disease, the green type of watercress has been found more tolerant of infection than the brown type (cf. Abst. 1479).

Nelder, J. A. Statistics report. (*pp. 69–70*).

Polygenic inheritance in the French bean is under investigation.

2530 **Forty-second Annual Report of the John Innes Horticultural Institution, Bayfordbury, Hertford 1951** (1952): Pp. 50.

Crane, M. B. Pomology Department. (*pp. 11–18*).

Cytoecology. Results of an analysis of polyploidy in the British flora show that the coefficient of polyploidy is generally higher in Scottish species than among the Atlantic and Germanic elements.

Brassica. The F_1 seed set obtained by interspecific hybridization between cultivated forms of *B. oleracea* ($2n = 18$) and *B. campestris* ($2n = 20$) was highest when turnip was used as the female parent. It is thought that the swede ($2n = 38$) may have arisen by similar interspecific hybridization followed by chromosome doubling.

Solanum. The unusual white colour of unripe fruits in a mutant form of *S. capsicastrum* behaves as a recessive to normal green, but variations in colour intensity may be cytoplasmically determined.

Apple. The high percentage (85%) of regular tetrads formed by the triploid Bertingheimer was found to be due to the gradual inclusion of univalents in the main nuclei during meiosis.

Pear. Eight genes determining colonial morphology and other cultural characteristics of 11 biotypes of *Venturia pirina* isolated from Conference have been identified. A number of varieties hitherto regarded as field resistant proved susceptible during the investigations; inheritance of resistance to all races is dominant to susceptibility.

The high frequency of diploid seedlings obtained after crossing diploid Fertility with triploid Beurré Diel appears to be due to apomixis.

Morphological aberrations observed after exposing diploid buds of Fertility to X ray doses of 2500 and 5000 r. were in proportion to dosage; 7500 r. proved lethal. Large-fruited sports of Williams and Fertility, previously thought to be tetraploids, were found to be periclinal chimeras, the outer layer being diploid.

Cherry. Two seedlings have been named Merton Late and Merton Glory; the former ripens in September and the latter has larger

fruits than any seedlings previously raised at the institution.

Tomato. In field trials since 1946, three intervarietal hybrids designated H_1, H_2 and H_3, have outyielded Harbinger and Exhibition. Under glass both H_1 and H_2 outyielded Potentate by 3·2 and 9·3% respectively; the early yield of H_2 was 22·2% greater than ES 5. It is likely that yield and quality of H_1 and H_2 would repay the cost of producing hybrid seed on a large scale.

A functionally male sterile introduction from Minnesota is being used to facilitate hybridization.

Yields from selections of the new strain of Puck with determinate growth habit are less than the original variety (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2418).

Two strains of *Lycopersicon pimpinellifolium*, designated Antimold A and B, are being released to breeders; they possess resistance to the two known races of *Cladosporium fulvum*. Some *L. esculentum* x *L. peruvianum* hybrids are also immune from both races.

Sweet corn. Promising inbreds have been developed from Extra Early Bantam x Merton. Results of crosses between various inbreds and dent maize indicate that seeds with *SuSusu* endosperm are more tolerant of cold than *susuSu* seeds.

By determining the ideograms of sweet corn hybrids grown in England it was possible to demonstrate their derivation from North American maize.

Lewis, D. Genetics Department. (*pp. 19–25*).

Investigations involving noneconomic members of the Compositae, Labiatae, Cruciferae, Scrophulariaceae and Amaryllidaceae were concerned with genes determining incompatibility mechanisms, interspecific antagonism between nucleus and cytoplasm, the genetics and chemistry of flower pigments, and mutation rates.

Tomato. Exposure to high temperatures during the seedling stage reduces, to a varying degree, the number of flowers produced in the first 5 inflorescences of all varieties. A wide range of temperature sensitivity was achieved by crossing Kondine Red and Vetomold, producing a large and small number of flowers respectively; some selections from the F_2 and F_3 showed a fivefold difference in flower number with a 10° C difference in temperature. Lines suited to a wide range of environments are therefore available.

Darlington, C. D. Cytology Department. (*pp. 26–32*).

Chromosome breakage. The effects of maleic hydrazide on chromosomes of *Zea Mays*, *Vicia Faba* and other species having detectable heterochromatin (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1576) have been investigated; there were no breakages in chromosomes of *Allium Cepa*, which seem to have very little heterochromatin. Observations are compared with the effects of X irradiation.

Secondary nuclei. During succeeding cell generations following treatment of *Vicia* and *Hyacinthus* with maleic hydrazide and X rays respectively, numerous micronuclei survive and subsequently rejoin the main nucleus.

Agropyron. Details are given of the different reproductive mechanisms in four polyploid populations of the self fertile New Zealand species *A. scabrum*; they show a gradation from a sexually reproducing homogeneous community, through extreme variability, to a completely apomictic homogeneous population.

Chrysanthemum. The occurrence of large grains, with unreduced chromosome number, and normal pollen in the same anther of tetraploid *Ch. atratum* has been investigated. At the first metaphase during formation of the large grains, the 18 bivalents split prematurely and separate completely, 36 chromosomes passing to each pole at anaphase; there is no second division so that only two large grains are formed. Analyses of bud sports associated with loss or gain in chromosome number have continued.

Rosa. The cytological survey of British species now includes garden roses.

2531 Relazione sull'attività del triennio 1948–50. **(Report on activities in the three-year period 1948-50).**
Staz. Agrar. Sper. Bari 1951 : Pp. 72.

Cytogenetics. Provision has been made for cytological research based on the squash method of studying the nucleus.

The cytological effects of the phosphoric esters have been investigated with a view to determining the gametic and somatic changes in plants treated with insecticides containing the toxic compound "parathion."

Wheat. Among the varieties produced during 1948–50 were the hard wheats Rossia and Biancolla and the *Triticum turgidum* variety Zingariello.

Studies of regional adaptation of varieties were undertaken with a view to obtaining optimum yield and quality.

Ultraviolet irradiation of six wheats increased the yield of the three soft varieties, but not of the hard varieties.

Oats. Selections of white spring oats, obtained through FAO from Kansas, proved inferior in yield to Italian varieties.

Maize. Tests of American hybrids were begun in 1948–49. Experiments on maize growing in arid districts had already been started some years ago with American and also Italian hybrids to discover which varieties combined a high yield of grain and green forage, while tolerating dry environmental conditions.

Three types A, B and C bred by the Bari Station from natural crosses were raised. In 1949, 11 types of maize were tested in irrigated plots, and 49 without irrigation. The varieties best suited to each treatment are listed.

Barley. To the 4–rowed hulled varieties 3 and 9, the 6–rowed hulled 340, the naked 6–rowed 29 and the naked 4–rowed 33, already obtained by selection, a new 2–rowed hulled barley 002 has been added. It yielded 14 q. in 1948 and 25 q. in 1949 and 1950. Comparative yield trials of Italian and English barleys are recorded.

Flax. Comparative studies of Italian flaxes and others from Morocco, Iraq, Mexico, Abyssinia, Denmark and Canada are in progress.

Almond. Crosses have been made to obtain higher yielding hybrids for the Puglia region, and 153 seedlings have been raised from 40 different hybrid combinations of many varieties. Interspecific crosses have also been carried out with peach and apricot to explore possible combinations and to obtain early types.

The varieties grown in Puglia have proved to be self fertile and also intercompatible.

Olive. In connexion with a study of the floral biology and the problem of flower abortion, experiments have been conducted on self fertilization and interpollination of varieties with a view to improving those of Puglia. The varieties from Puglia showed high self fertility and intercompatibility as compared with those from other districts.

Artificial pollinations of 2554 flowers of 7 trees have been carried out in an attempt to obtain varietal combinations with high yield and quality and resistance to frost.

A comparison has also been undertaken of 750 sexual and asexual seedlings of different varieties with regard to their yield and resistance to unfavourable weather conditions.

Vine. Suitable stocks for the variety Regina are being sought.

Tomato. Trials, which included a few Italian varieties, were run with the result that S. Marzano and Pearson C were recommended for industrial use in view of their high output of pulp.

Legumes. Selection of beans, chick peas and vetches is in progress together with studies on the biology of flowering.

2532 Peĭve, Ja. V. [Peive, J.]
(The results of the scientific research at the Academy of Sciences of the Latvian SSR in the year 1950).
Latv. PSR Zinātņu Akad. Vestis 1951 : No. 2 (43) : 203–54. [Russian].

Notes on varietal trials and breeding of some economic plants, and agrobiological methods used at various Latvian institutes are included.

Wheat. Lodging of the productive winter variety Kursas has been overcome by Mičurinite methods. The technique of cultivating branching wheat is being developed.

Forage plants. New lucernes and clovers have been developed at the Pēterlauku Research Station (cf. Abst. 2783). The lucernes Severnaja Gibridnaja [Northern Hybrid], Grimm-Zaĭkevič and Pure have given a good account of themselves in the trials.

Potato. Many new varieties have shown resistance to wart.

Fruits and vegetables. Breeding work with various fruits and vegetables is in progress at the Pure Horticultural Research Station.

Forest trees. Breeding work with various forest trees, including vegetative hybridization, is reported. Some promising hybrids of *Populus* are under trial.

2533 Carlsen, H.
Kan hensynet til arbeidsforbruket, arbeidsfordelingen og nye arbeidsmetoder medføre endringer i arts- og sortsvalget i jordbruket og foredlingsoppgavene i plantekulturen? **(May considerations of labour utilization and distribution and of new methods lead to changes in the choice of crops and varieties in agriculture and in the tasks of the breeder in plant cultivation ?).**
Tidsskr. Norske Landbr. 1952 : Nos. 1–2 : 7–17.

In this lecture the speaker exemplified how recent changes in the supply and the use of agricultural labour and mechanization may affect not only the farmer's choice of crop or variety, but also his requirements as regards new varieties and types of cereals and other crops, produced by the breeder. Mechanized harvesting of cereals, fodder cabbage and other crops has created a demand for qualities such

as early maturing, resistance to shedding and germination in the ear, stiffness of straw, and erect and not too leafy haulms in potatoes. The potato Prestkvern is mentioned as satisfactory in the last two respects and in requiring much less labour to remove the haulms.

2534 Amelung, J.
Productiviteitsverhoging in de akkerbouw door plantenveredeling. **(Increasing productivity in agriculture through plant breeding).**
Landbouwk. Tijdschr., Wageningen 1952: **64** : 328–30.

In Holland, the use of new varieties of various crop plants led to an increase equal to about 7% of the total increase in agricultural productivity estimated for 1932–55 (cf. p. 169).

2535 **Dutch breeders of new plant varieties.**
Windmill, The Hague 1952 : No. 6 : 16–17.

Yield increases made possible by the use of recently developed varieties of wheat, barley, sugar beet and peas are discussed, with reference to the work of local breeding institutes in the Netherlands and the introduction of new varieties from other parts of Europe. Breeding programmes under way in the Netherlands are briefly mentioned.

2536 **Annual Departmental Report by the Director of Agriculture, Fisheries and Forestry Hong Kong for the financial year 1950-51** : Pp. 72.

Trials are in progress to compare the yielding ability of rice varieties introduced from Ceylon and British Guiana with local varieties. Selections are being made from five strains of local origin to establish pure lines.

Varietal trials are also reported on sweet potato, citrus fruits, groundnut, green vegetables and tomato. Four strains of *Phaseolus*, differing in time of maturity, have been selected for release to growers.

2537 **Proceedings of the Thirty-sixth Indian Science Congress, Allahabad, 1949.**

The following papers were among those presented at the congress.

Part II. Presidential addresses

Vasudeva, R. S. Soil-borne plant diseases and their control. (*pp. 173–86*).

Brief reference is made to the evolution of physiological races of various pathogens, and the need for maintaining breeding programmes to develop crop varieties with sufficient disease resistance.

Part III. Abstracts

Rangaswami, K. Sex chromosomes of Trichosanthes palmata, *Roxb.* (*p. 137*).

During a cytological investigation of sex chromosomes, the somatic complement of $2n = 44$ was recorded for the first time.

Bhaduri, P. N. and Sarma, A. K. Further investigation on the cytogenetics of Scilla *species.* (*p. 138*).

Species having heteromorphic pairs of nucleoli were found to produce gametes which were dissimilar with respect to nucleoli and satellited chromosomes. It is therefore suggested that individuals containing nucleoli which vary constantly and specifically in size are structural hybrids.

Bhaduri, P. N. and Sarma, A. K. Karyotype analysis in some of the Indian strains of barley. (*p. 139*).

Differences in the number and position of secondary chromosomal constrictions between six strains obtained from the Indian Agricultural Research Institute are described. Intervarietal crosses are being undertaken to determine whether such differences arose by nonhomologous translocations.

Bhaduri, P. N. and Ahmed Samsul Islam. Cytogenetics of some common fruit trees I. Eugenia *species.* (*p. 139*).

In spite of confusion caused by the presence of multivalents and univalents in addition to bivalents at metaphase I, the following chromosome numbers have been determined: *E. uniflora*, $2n = 22$; *E. Jambos*, $2n = 46$; *E. jambolana*, $2n = 66$; and *E. jambolana* var. *caryophyllifolia*, $2n = 44$. Assuming the basic number to be 11, *E. jambolana* var. *caryophyllifolia* is a tetraploid from which *E. jambolana* may have arisen by the union of an unreduced egg with a normal male gamete. It is supposed that *E. Jambos* is a hypertetraploid with one pair of duplicated chromosomes ($4n + 2 = 46$).

Bhaduri, P. N. and Bose, S. Cytogenetics of some fruit trees II. Grewia asiatica *Linn. and* Nephelium longana *Camb.* (*pp. 139–40*).

Somatic chromosome numbers of 36 and 30 are reported for *G. asiatica* and *N. Longana* respectively. The latter proved to be a diploid species with normal meiotic behaviour. *G. asiatica*, on the other hand, is an amphidiploid with at least two quadrivalents, producing

dissimilar gametes. The relationship between disjunctional or nondisjunctional orientation of quadrivalent rings and duplication or deficiency of genes in the gametes is discussed. This structural hybridity supports observations that *G. asiatica* occurs as a mixture of closely related heterogeneous forms.

Mitra, J. A preliminary investigation on the karyotype analysis of wild and cultivated tuberiferous solanums. (*pp. 140–41*).

Analyses of structural differences between the somatic chromosomes of wild and cultivated species obtained from the Commonwealth Potato Collection, Cambridge, are reported. The diploids *Solanum pseudomaglia* and *S. Kesselbrenneri* have, respectively, 8 and 10–12 chromosomes with secondary constrictions; the triploids *S. Rybinii* and *S. Commersonii* each have 18 secondarily constricted chromosomes; and in the tetraploid Sharpes Express as many as 26 secondarily constricted chromosomes can be detected.

The nature of polyploidy and the probable origin of certain cultivated varieties are discussed.

Chakravorti, A. K. Cytogenetical studies in Musaceae. I. Karyotype analysis of Musa *and fragmentation of chromosomes as an evolutionary process in the genus.* (*p. 141*).

Evidence is presented for the origin of diploid species of *Eumusa* ($2n = 22$) from 18–chromosome forms such as *M. superba* by fragmentation of two particular pairs of chromosomes, the breaks occurring at regions of secondary constriction.

The exceptionally large number of nucleoli (26–34) in *Physocaulis* ($2n = 18$) and *Eumusa* cannot be due solely to either polyploidy, fragmentation or nonhomologous interchange between nucleolar and nonnucleolar chromosomes; instead, it is assumed that each genome possesses more than one nucleolus.

Chakravorti, A. K. Cytogenetical studies in Musaceae. II. Meiosis in some diploid species of Musa *with special reference to secondary association of bivalents.* (*pp. 141–42*).

The morphology of the chromosomes in two species of *Physocaulis* and the maximum association of bivalents indicate that both species are amphidiploids with a basic chromosome number of 4, and not 8 as previously suggested by Cheesman.

Chakravorti, A. K. Cytogenetical studies in Musaceae. III. Cytological considerations for the delimitation of the subgenus Rhodochlamys *of the genus* Musa. (*p. 142*).

A detailed morphological comparison between chromosomes of *Rhodochlamys* and *Eumusa* emphasizes differences in the number and size of nucleoli, size of chromosomes, number and type of secondary constrictions and the nature of the associations between bivalents.

Chakravorti, A. K. Cytogenetical studies in Musaceae. IV. Karyotype analysis of the parthenocarpic bananas and the cytological basis of their variation. (*pp. 142–43*).

Parthenocarpic varieties ($2n = 33$) exhibit phenotypic differences which may be correlated with observed variations in the number of a particular type of chromosome, the sum total of chromosome lengths, the length of an individual chromosome and the total number of nucleolar constrictions. It is suggested that such chromosomal variations arise by rearrangement of segments following deletion, translocation and inversion in somatic meristems; thus genotypes differing from parental tissues may be vegetatively propagated.

Chakravorti, A. K. Cytogenetical studies in Musaceae. V. Idiogram studies with special reference to chromosome-nucleolus relationship and its bearing on the cytogenetics of Heliconia. (*p. 143*).

There is evidence for the evolution of *H. brasiliensis* ($2n = 24$) from *H. metallica* ($2n = 22$) by fragmentation of one pair of chromosomes across the secondary constrictions. It appears, from a study of *H. psittacorum*, that fragmentation at a nucleolar constriction alters the caryotype and results in a proportionate increase in the number of nucleoli. *H. psittacorum* proved to be a structural hybrid in respect of heteromorphism in nucleolar size.

The nature of differentiation between species of *Heliconia* suggests that structural changes of the chromosomes, rather than polyploidy, have been responsible.

Varma, G. Albinism in sugarcane. (*pp. 191–92*).

Data are presented to show that certain cultural treatments, such as delay in time of planting or irrigation after sowing, affect the incidence of albino plants in a population; the genetical determination of albinism is not, however, overlooked.

Dutt, N. L. and Subba Rao, K. S. On the so-called "deterioration" in sugarcane varieties. (*pp. 192–93*).

In trials at Coimbatore, no significant differences in respect of weight of canes per row, brix value, sucrose content or juice purity were found between (1) clones of Co. 419 claimed by growers to have deteriorated and (2) Co. 419 canes maintained at the experiment station. Contemporary data agreed with results of previous trials.

Singh, H. B. and Pal, B. P. Some observations on the interspecific cross Luffa acutangula *Roxb. x* L. cylindrica (*Lour.*) *Roem.* (= L. aegyptiaca *Mill*). (*pp. 196–97*).

F_1 hybrids from *L. acutangula* x *L. cylindrica* were of two types: (*a*) "normal" seedlings resembling the parent varieties in general growth habit, but bearing bitter fruits; and (*b*) "abnormal" plants of dwarfed habit with irregularly shaped leaves and abnormal racemes, bearing sweet fruits. Both types showed a high percentage of viable seeds; although "normal" hybrids produced 57·5% more fruits than *L. acutangula* they are economically useless.

Nath, P. Virus diseases of Indian potatoes. (*p. 201*).

Sathoo was the only potato with resistance to leaf roll in a trial of 24 local varieties at the Simla Potato Breeding Station. Viruses X and Y were recovered from 16 and 19 varieties respectively.

2538 **Proceedings of the Thirty-seventh Indian Science Congress, Poona, 1950**

The following papers were included:—

Part II. Presidential Addresses

Mahalanobis, P. C. Why statistics? (*pp. 1–25*).

A general account is given of the development and importance of statistical analysis, and its application to numerous problems, including crop sampling.

Sukhatme, P. V. Sample surveys in agriculture. (*pp. 51–73*).

Methods of estimating crop yields are reviewed, with reference to surveys of wheat, sorghum, rice and cotton carried out by the Indian Council of Agricultural Research in nine provinces, using the stratified random sampling technique.

Maheswari, P. Contacts between embryology, physiology and genetics. (*pp. 135–49*).

Various plant breeding problems are discussed under headings which include the following: the barriers to crossability; infrequent flowering or disharmony in the time of flowering of the parents; incompatibility in relation to chromosome number of the two parents; failure of fusion of the male and female nuclei; embryo culture; and induced parthenogenesis.

Sethi, R. L. Planning for agricultural development in future. (*pp. 199–216*).

Research is in progress to improve the nutritive value of many cereals and legumes. Efforts to increase the disease resistance of crops are described, with emphasis on the rust resistance of wheat; promising selections from the F_5 of multiple crosses between several varieties possessing resistance to different rusts indicate that resistance to all common forms of rust may have been successfully combined in a single strain.

Part III. Abstracts

Rai, J. N. On the leaf spot disease of Citrus acida *var.* variegata. (*p. 58*).

Other local species and varieties proved resistant to the pathogen (*Colletotrichum gloeosporides*).

Asana, R. D. and Malkhani, T. J. On the uptake of nitrogen by three varieties of wheat. (*p. 63*).

In trials at New Delhi, NP 52 absorbed more nitrogen from the soil than either NP 165 or NP 710, and produced the largest number of spikelets and grains per ear. The percentage of nitrogen in NP 52 grains exceeded that of the other varieties.

Kar, A. K. A note on the grain standardization in rice. (*p. 66*).

Selections with the fine white translucent grain and desirable milling and cooking qualities of the winter rice Rupsal have been obtained at the Bankura Rice Research Station from crosses between Rupsal and locally adapted varieties differing in date of maturity. Those giving high yields include true breeding strains of Ashkata x Rupsal, Khiramungi x Rupsal, Nonaramsal x Rupsal, Bhasamanik x Rupsal and Raghusal x Rupsal.

Govindaswami, S. Somatic chromosome numbers of some wild and cultivated varieties of Musa. (*pp. 68–69*).

The chromosome complements of 18 specimens collected in different parts of India are listed. Although seedless table varieties are normally triploids ($2n = 33$), the seedless Safet Velchi appears to be a diploid ($2n = 22$) and the triploid varieties Ennabenian, Kallumonthan, Anaikomban and Poovan all produce seeds.

Kumar, L. S. S., Deodikar, G. B. and Vishveshwara, S. A further evidence on sex chromosomes in Coccinia indica. (*p. 69*).

Evidence for the presence of two X chromosomes in the male is presented in the form of photomicrographs showing their similarity in size and shape.

Kishore, H. and Parthasarathy, N. Colchicine induced polyploids in linseed. (*p. 69*).

Seed setting ability varied among tetraploids resulting from application of colchicine to the young plumules of rust resistant diploids developed at the Indian Agricultural Research Institute, New Delhi. Selections were made from tetraploids with at least 7 seeds per capsule; both capsules and seeds were much larger than in the diploids.

Basudev Roy. Studies on the cytogenetics of mango. (*pp. 69–70*).

While 14 of the 15 cultivated varieties investigated have 40 somatic chromosomes, SN/1 has $2n = 42$ and is thought to be an aneuploid.

Ranganathan, B. and Subramaniam, M. K. The riboflavin excreting mutant and the problem of variability in yeasts. (*pp. 70–71*).

The possibility of using artificially induced riboflavin-producing mutants for industrial purposes is discussed, with reference to their instability which is expressed by variation in the sculpturing of giant colonies. As tetraploids are generally stable it is suggested that all strains suitable for industrial use should first undergo treatment to induce polyploidy.

Subramaniam, M. K. Alleles and their time of expression in yeasts. (*p. 71*).

This paper has already been summarized (cf. Abst. 1682).

Duraiswami, S. Effect of chromosomal duplication on the alcohol tolerance of a brewery yeast. (*p. 71*).

Under all conditions studied, the tetraploid form showed greater tolerance of alcohol than the original diploid.

Mitra, K. K. Fermentative ability of the riboflavin excreting mutant yeast. (*pp. 71–72*).

A comparison between the fermentative capacity of the original bottom yeast and the mutant top yeast showed that the mutant had lost the power to ferment glucose, fructose, galactose, maltose and sucrose. The riboflavin excreted by the mutant would presumably have been incorporated as enzymes in the normal strain.

Balasubrahmanyan, R. and Santhanam, V. The inheritance of 'dwarf' mutants in G. arboreum *race* indicum. (*p. 77*).

A summary of this paper has already appeared in *Plant Breeding Abstracts*, Vol. XXI, Abst. 2827.

Balasubrahmanyan, R., Ramaswamy Mudaliar, V. and Santhanam, V. The inheritance of lint colour in Coconadas cotton. (*pp. 77–78*).

This paper was summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 2842.

Gokhale, V. P., Chowdhury, B. B., Patel, M. K. and Chavan, V. M. Breeding rust resistant varieties of wheat for Bombay Province. (*p. 86*).

Homozygous segregates combining resistance to all common local physiological races of *Puccinia graminis* var. *Tritici* with desirable agronomic characters have been obtained from the following crosses between local and exotic strains: Kenya E 144 x Niphad 4, Hofed 1 x Niphad 4 and Mondhya 417–5 x Hofed 1.

Patel, M. K. and Kamat, M. N. Control of plant diseases through disease resistance in Bombay. (*pp. 86–87*).

Methods of developing wilt resistant cotton, stem rust resistant wheat and blast resistant rice are reviewed to show that selection based on field resistance alone is unreliable; trials conducted in greenhouses and small highly infected plots are recommended for the isolation of resistant strains.

Bhat, N. R. The measurement of linkage between characters determined by dissimilar factors with complete dominance. (*pp. 89–90*).

Suggestions are made concerning methods for detecting linkage or independence, for calculating the degree of linkage in terms of the recombination fraction and for extracting information from the data when there are more than four segregating phenotypes.

Kumar, L. S. S. (*p. 91*).

A comparison between the camphor content of the octoploid *Ocimum kilimandscharicum* ($2n =$ 64–72) and its colchicine-induced derivative with 128–140 somatic chromosomes has shown that both polyploids have similar camphor contents. The increased vegetative vigour of the higher polyploid may, however, give rise to an increased yield of camphor per acre. Seed

setting ability was considerably reduced in the colchicine-induced polyploid.

Deodikar, G. B. A preliminary note of the selective transference of the individual chromosomes of Gossypium anomalum *to* hirsutum *cottons.* (*p. 91*).

Back cross progenies of the synthetic hexaploid derived from *G. hirsutum* (AADD) x *G. anomalum* (BB) back-crossed to *G. hirsutum* show some evidence of: (1) exchange of genes between the A and D genomes in the presence of the B genome; (2) transference of partially homologous genes from the B genome to A and D genomes; (3) substitution of chromosomes in A or D genomes by their partial homologues from *G. anomalum*; and (4) addition of *G. anomalum* chromosomes to the *G. hirsutum* complement.

Part IV

Application of genetics in animal and plant breeding. (*pp. 49, 68–80*).

The discussion was opened by B. P. Pal with a general survey of recent advances in plant breeding, illustrated by reference to the problem of developing varieties of wheat with resistance to all the strains of rust prevalent in northern India.

The practicability of increasing productivity by application of methods advocated by Lysenko was mentioned.

Symposium on rice. (*pp. 85–108*).

One section, concerned with the genetics of rice, deals with modern methods of selection and hybridization in use at the Central Rice Research Institute, Cuttack, to improve yielding ability, earliness and resistance to *Piricularia Oryzae*; hybridization between *japonica* and *indica* types is under way.

2539 Proceedings of the Thirty-eighth Indian Science Congress, Bangalore, 1951.

The following papers were among those presented at the conference:

Part III. Abstracts

Jambunathan, M. V. Double sampling methods in forecasting jute yield. (*p. 12*).

Data from jute cutting experiments in West Bengal show a significant regression of the weight of jute fibre on the weight of the green plant. Thus fibre yields for any particular region can be estimated from the weight of sample cuttings.

Banerji, I. Morphological and cytological studies in Citrus grandis. (*p. 143*).

Details of gametogenesis are presented.

Paul, A. K. and Datta, R. M. Development of the female gametophyte in Oryza coarctata *Roxb.* (*p. 145*).

Cytological observations of megaspore formation are reported.

Deshmukh, V. K. and Kanitkar, U. K. Growth of seedlings of jowar varieties. (*p. 150*).

Varietal differentiation was noted in respect of the ratio of dry matter to water content of seedlings grown at Poona.

Misra, G. Photoperiodic response in some early varieties of paddy. (*pp. 152–53*).

The percentage of plants in which ear emergence was inhibited by subjecting 18 days' old seedlings to 10 hr. photoperiods for 30 days varied from 50% in varieties T 136 and T 22 to 21% in T 27. Photoperiods of 24 hrs. for 30 days produced a significant delay in time of ear emergence in T 22, but the date of ear emergence in T 136 was unaffected by similar treatment.

Dutt, N. L. and Thuljaram Rao, J. Progeny tests on inheritance of pith in sugarcane seedlings. (*p. 169*).

The results of progeny tests carried out at Coimbatore for three years to assess the value of varieties as parents have shown that Co. 453 and Uba Marot transmit pithy cores to their progenies; a higher percentage of pithy seedlings result from crosses between two pithy parents than when a nonpithy variety is used as the pollen parent. Solid canes were obtained from Co. 508 x Co. 244 and Co. 508 x Co. 301.

Part IV. Late Abstracts

Nanjundayya, C. Variation in weight per unit length along the length of a cotton fibre and its effect on the determination of other fibre properties. (*p. 20*).

Gossypium herbaceum and *G. hirsutum* gave the highest and lowest variation in weight, respectively, along the length of a fibre; *G. indicum* and *G. neglectum* showed intermediate values.

Venkatansrasinga Rao, M. B. and Sampath, S. The problem of yield in rice. (*pp. 20–21*).

The need for further studies on the relationship between multiple factors determining yield is stressed.

Asana, R. D. and Mani, V. S. Observations on the influence of indoleacetic acid on the growth of three varieties of wheat. (*p. 31*).

Significant increase in grain yield, due to

increased tillering and a larger number of ears, was obvious in C 228 after treatment with indoleacetic acid; slight increases in grain yield of S–40 and NP 165 were not significant.

2540 **Quarterly Review of the Department of Agriculture, Nicosia, Cyprus, 1st July to 30th September, 1951** : No. 25: Pp. 29. (Mimeographed).

Wheat. The results of trials of local varieties, introductions and hybrids between introduced and local wheats are summarized. Information on reaction to rusts is included.

Barley. Trials of local and foreign varieties are summarized.

Sorghum. Early maturing varieties from the USA were tested.

Potato. Spring crop trials suggested that Stormont Dawn and Arran Peak may be suitable for Cyprus.

Artemisia. *A. brevifolia* and *A. kurramensis* are being subjected to trial.

Onion. Local varieties are being selected to improve their uniformity and keeping quality. Seeds were obtained from crosses between the local flat type and Australian Brown.

2541 **African Regional Scientific Conference, Johannesburg, October 17 to October 28, 1949 (1949–50). II. Statements and communications.** Pp. 469.

The following papers of interest to plant breeders were among those presented at the conference.

Saunders, A. R. Efficiency of design in field experiments. (*pp. 123–26*).

Data on a maize uniformity trial at Potchefstroom are presented to show the gains in efficiency obtained by superimposing various lattice designs. Gains increased with enlarging plot size up to 5 x 20 sp. yds.; with plots larger than this, lattice squares were more efficient than simple, triple and balanced lattices.

Anderssen, F. G. and Marloth, R. H. Subtropical and tropical fruits. (*pp. 130–34*).

A brief survey of horticultural research carried out at Nelspruit, Eastern Transvaal, mentions selection of citrus, mango, litchi and avocado for adaptability to different localities, and breeding improved varieties of pawpaw and pineapple. The release of Hortus Gold, a new yellow-fruited pawpaw which transports well, is reported.

Laubscher, F. X. Plant breeding for southern Africa. (*pp. 138–41*).

The development of plant breeding in the Union of South Africa is briefly surveyed, with particular reference to indigenous crops, including millets, sorghum, forage grasses and legumes, and adaptation of material introduced from countries with analogous climates.

van der Plank, J. E. Research in plant pathology in Africa. (*pp. 145–48*).

This general review of plant pathological research in South Africa deals also with breeding disease resistant varieties of cereals, sugar cane, potato, fruits and vegetables.

Glover, J. and Storey, H. H. Research on agriculture in semi-arid regions. (*pp. 165–66*).

The need for developing more drought resistant crops in Africa is emphasized.

Peat, J. E. Cotton growing research in eastern and southern Africa: its bearing on plans for increased African production. (*pp. 167–68*).

Some results of genetical research are reviewed; these include analyses of resistance to jassid and bacterial blight.

Storey, H. H. Research on virus diseases of plants. (*pp. 168–70*).

Breeding for resistance to virus diseases of maize, cassava, groundnut and passion fruit is in progress in East Africa.

Bunting, A. H. Some biological problems arising from large scale mechanized agriculture in East Africa. (*pp. 170–73*).

In connexion with the East African Groundnut Scheme, maize, sorghum and other cereals, castor oil, sunflower, groundnut, soya bean and other beans and peas have been introduced from homoclimatic semiarid countries, and are being selected for adaptation to mechanization, length of day and season, and for resistance to drought and diseases.

Phillips, J. Research in plant ecology in Africa. (*pp. 173–77*).

The importance of ecological research is stressed with reference to adaptability of crop varieties, their resistance to drought and frost, and factors affecting pollination of indigenous and exotic plants.

Hopkins, J. C. Long-term botanical research. (*pp. 180–82*).

Although increasing interest is being taken in the development of varieties of economic plants resistant to diseases prevalent in Africa, there is need for more prolonged genetical research in

this connexion and in experimental taxonomy of many indigenous African genera.

2542 *Rapport annuel pour l'exercice 1949. (**Annual report for the financial year 1949**).
Publ. Inst. Nat. Agron. Congo Belge 1950: Hors Sér.: Pp. 306.

This report (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 877) from the National Institute for Agricultural Research in the Belgian Congo contains the following matter of interest to breeders:—

Pyrethrum. At Mulungu-Tshibinda, seedling and clonal selection is being pursued.
A significant correlation was found between the relative weight of the achenes as compared with the other floral organs and the content of pyrethrins.
Wheat. At the Kisozi Experimental Station, the line Kisapu continues to show remarkable resistance to rust, earliness and high yield.
Maize. Hybridization to obtain a stable synthetic hybrid was undertaken.
At the Nioka Experimental Station earliness is the main basis of selection.
The variety Kisozi is reported as high yielding and of good quality for eating in the green or dry state or as flour. Early lines are being crossed with existing breeding material to shorten the growth cycle.
Millet. At the Kiyaka Station mass selection of *Pennisetum spicatum* based on the proportion of fertilized seeds and ear length is proceeding.
Eleusine. At the Kisozi Experimental Station *Eleusine* is undergoing selection for yield, earliness, hardiness, tillering capacity, uniform ripening and resistance to diseases and insect pests.
Rice. In the selection plots, 47 promising crosses have been noted and attention is drawn to the high weight of the kernels of some hybrid progenies.
Coix Lacryma-Jobi. The collection is being classified according to the form, colour and hardness of the glumes, and the possibility of a correlation between hardness, colour and thickness is being investigated.
Sweet potato. Over 8000 intervarietal pollinations have been carried out to build up material with resistance to viruses or *Plenodomus destruens*, vegetative vigour, productivity and pleasing flavour.
Cotton. According to a report from the Bambesa Experimental Station, progress is being made with: pedigree selection; hybridization, including selfing of the hybrid Stoneville 2 x DP/12/12; experiments to improve fibre length in Stoneville 2/180 by back-crossing to Stoneville 0·4 and 2; selection, crossing and back-crossing for wilt resistance; and comparative variety trials.
At the Gandajika Station 1144 lines are undergoing pedigree selection and include material from artificial crosses, triple hybrids and some natural crosses. In the wilt-infested Sankuru region, Gar 105 and Stoneville 2/180 did very well.
Urena lobata. Selection is in progress at the Gimbi Experimental Station for Fibre Plants.
Cassava. Selections have been made for yield, resistance to lodging and disease, erect habit with few branches, low toxicity, diameter of stems, node development, shape of tuberous roots and their mode of attachment.
Tobacco. At the Kaniama Experimental Station, preliminary selection for disease resistance is reported.
Coffee. At the Mulungu regional laboratory observations on the susceptibility of 26 species and varieties of *C. arabica* to *Antestia bechuana* were continued.
The offspring of wild *Coffea canephora* trees that have proved resistant to fungi are being retained as breeding material.
Cacao. The study is being continued of trees obtained by controlled pollination and of lines from uncontrolled pollination of Forastero and Criollo mother trees.
Oil palm. At Yangambi, in addition to yield recording, crosses and selfings of the best trees were carried out and over 100 hybridizations between *albo-nigrescens* and *albo-virescens* varieties were also undertaken to elucidate the inheritance of absence of carotene in the pulp. About 100 intraspecific and interspecific crosses were made. The first hybrids of *Elaeis melanococca* x *E. guineensis* have come into bearing.
Cinchona. At the Mulungu-Tshibinda Experimental Station, selection of clones and outpollinated seedlings of *C. Ledgeriana* is in progress. Eight clones at Tshibinda are being used in a new trial of resistance to *Helopeltis*.
Other subjects of investigation were: flowering and fruiting, intraclonal variation in quinine content and a biometrical study of the minimum number of specimens that should be studied in collecting data for comparison.
Hevea. The yield of the family Tj 1 was recorded from selfed and outpollinated progeny;

* An extended summary of this report is on file at the Bureau.

the figure for rubber content of the former was 33·8%.
An experiment to test Cramer's new method of selection for use in laying down young clones from clonal seedlings aged 1–2 years showed that the most vigorous trees predominated in the higher classes selected by the Testatex method.
Tung. *A. Fordii* and *A. montana* have been found to differ in regional adaptation. Clonal and seedling selection is being carried out.
Groundnut. As poor results were obtained with artificial hybridization, natural crosses have been tried with A 65 and A 20. High yield, long pods with thin shells and large red kernels are the desiderata in breeding.
Yields were recorded from several natural crosses.
At the Gandajika Station the best hybrid progenies from 285 strains underwent selection and 116 high producing strains were chosen.
Legumes. The *Phaseolus* variety Varivaganda showed marked superiority in yield in a comparative trial in which resistance to anthracnose and to *Melanogromiza* were also tested.
Attempts were made to obtain natural crosses between a variety of soya bean E 36 with green integuments and cotyledons and E 42 in which both are yellow.

2543 **Annual Report of the East African Agriculture and Forestry Research Organization. (Incorporating the East African Agricultural Reseach Institute, Amani) 1951** : Pp. 88.

The headquarters of the above organization were established at Muguga, Kenya, in 1951. The projected programme of plant breeding and genetics is mainly a continuation of the work formerly carried out by the Pathology Section, Amani, on virus resistance in cassava, maize and groundnut. A policy of integration of the work of the EAAFRO with other breeding in progress in East Africa is to be pursued.
Maize. Breeding for resistance to streak virus has been resumed. When subjected to an intensive testing system, many plants apparently possessed immunity; others showed resistance in the form of a strong capacity of recovery.
Sorghum. The possibility of breeding types resistant to *Striga hermonthica* is being explored.
Groundnut. Wild *Arachis* spp. are under test for their reaction to rosette virus, with a view to utilization in breeding. Preliminary results suggest that some may be immune.
***Cupressus* spp.** Work is being carried out with the long-term aim of selecting and breeding superior strains immune from canker (*Monochaetia unicornis*).
Cassava. In the programme of breeding for virus resistance, backcrossing of hybrids involving tree cassava, ceara or *Manihot dichotoma* continued. Trials for mosaic resistance were carried out on clones of various origins. A large proportion of clones belonging to both the second and third back-cross generations remained free from mosaic most of the season. With respect to yield, the third back-cross generation of ceara hybrids is in general more promising than that involving *M. dichotoma*. In a preliminary trial a few *M. melanobasis* x cassava hybrids have exhibited resistance to mosaic and comparatively high yielding capacity. Symptoms of brown streak are rare in this series of hybrids. In a yield trial comparing the ceara hybrid 4332/2 with the standard Msitu, the former has shown considerable tolerance of mosaic.

2544 **Annual Report of the Department of Agriculture, Uganda Protectorate for the year ended 31st December, 1949** (1951) : Pp. 45.

Potato. Trials with varieties reputed to be resistant to *Phytophthora infestans* are being undertaken.
Cotton. Inheritance of resistance to *Verticillium* wilt appears to be simple; genes for resistance are being transferred to BP 50 and related strains.
Cassava. The introduction of mosaic resistant varieties is reported in the northern and eastern provinces, where susceptible varieties are being completely replaced.

2545 **Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya 1950** (1952) : Pp. 38.

Pyrethrum. Work on the production of improved strains for different altitudes continued at five stations. New crosses were made. Data from selections have indicated that a significant negative correlation exists between yield of flowers and pyrethrin content. An exceptionally vigorous strain with low pyrethrin content was crossed with 13 clones having a high content. Plants combining moderately good pyrethrin content and increased vigour of flowering have been developed from these crosses; they have given pyrethrin yields per acre 50% higher than those from crosses between parents both with high content. These promising selections will probably be most suitable for medium altitudes.

Seed production of the new strains 188 x 214 for low to medium altitudes, 1970 Control for medium altitudes and 127 x 481 and 127 x 468 for higher altitudes is under way.

Cereals. Six new wheats were released to farmers (cf. Abst. 1094). Many new crosses were effected. A ninth race of black stem rust has appeared to which all except one of the commonly grown varieties is susceptible. At Ol Joro Orok and Molo breeding aims at the development of varieties suited to the cooler climate and longer season of the areas concerned, and possessing resistance to yellow ear rust.
Introduced varieties of oats and barley were subjected to trials.
Work is being carried out to develop maize hybrids suited to different parts of Kenya. Use is being made of local varieties and of material from the USA, Southern Rhodesia and South Africa for the breeding of adapted hybrids, since introduced hybrids are not successful in Kenya. Inbreeding and testing for general combining ability of S_1 lines by top-crossing were carried out. Harland's intra-genotypic method of improvement received attention (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 26 and 460).
Sorghum breeding aims at the improvement of local varieties for African use and the production of dwarf types for combine harvesting in the European areas. A collection of local varieties is being built up. Introduced varieties, especially dwarf types from the USA, are under trial. If these dwarf sorghums are unsuitable, a programme of hybridization with local varieties will be undertaken.

Potato. Five out of the six varieties from the Scottish Society for Research in Plant Breeding were attacked by late blight, although previously immune. Immunity was only maintained by 1512 d.4; this variety is immune from biotypes A, B, C, E and F. The presence of wild perennial *Solanum* spp. which act as hosts of the late blight fungus may provide scope for the evolution of more virulent strains.

Sunflower. Semidwarf and dwarf varieties were selected for low height of plant, with a view to developing strains which will not grow too tall for combine harvesting in the areas of heavy rainfall at altitudes of over 7000 ft.

Fruits and vegetables. Variety trials of tree and small fruits and vegetables continued.
Crosses between the strawberry Royal Sovereign M 40, which is susceptible to leaf spot, and the resistant variety Melba have failed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1680). Huxley M 44 is the most promising English strawberry so far introduced.

2546 **Report of the Department of Agriculture, Nyasaland Protectorate, for the year 1950.** Part II : 1952 : Pp. 36.

Maize. Nearly all the single and double hybrids tested outyielded the open-pollinated varieties Hickory King and Salisbury White but the differences were not significant.
Tung. The results of trials of A and B types of clone are summarized. In the A type the main trunk increases steadily in height and produces tiers of primary branches; secondaries arise on the primary branches at relatively long intervals. In the B type the main trunk usually ceases to be distinguishable after the first or second whorl of primaries, which produce secondaries at short intervals. Seedlings produced by controlled pollination within each of these types are being studied. In a survey of *Botryosphaeria* dieback, the B type showed a much higher incidence of the disease than A trees.

2547 **Annual Report of the Department of Agriculture, Colony of Mauritius 1950** (1951) : Pp. 92.

Varietal trials of potato, *Furcraea*, yam, groundnut and soya bean were undertaken.
Sugar cane. Details are given of numerous crosses effected at Réduit and Pamplemousses; selection from seedling progenies was also carried out. Many introductions from Barbados, Florida and South Africa are undergoing trials for adaptability. M 423/41, a locally developed cane, has been added to the list of varieties recommended to local growers; it has performed well in field trials under diverse conditions and has consistently given higher yields of cane and sugar per acre than M 134/32.
Tobacco. Newly imported varieties from India and South Africa are being tested. Rigorous selection for type, yield, quality and resistance to black shank and nematode was carried out among hybrid progenies of Amarello crossed with strains of Oxford and Bonanza, and among numerous intervarietal flue-cured hybrids.

2548 **Annual Report of the Director, Experimental Farms Service, Department of Agriculture, Ottawa, Canada 1950-1951** : Pp. 26.

A brief report of breeding work on cereals, forage grasses and legumes, field beans, potato, linseed, apple, cabbage and tomato is included (cf. Abst. 997).

2549 **Report of the Federal Experiment Station in Puerto Rico 1951.** US Dep. Agric. 1951 : Pp. 36.

Insecticides. Crosses were effected for the first time in Mayagüez between three *Derris elliptica* varieties, Changi 3, St. Croix and Sarawak Creeping (cf. Abst. 166).

At the third harvest of an experiment carried out at Nicaragua to evaluate four varieties of *D. elliptica* and one of *D. malaccensis* in respect of chemical and toxic constituents, Changi 1 proved superior.

Analyses of rotenone content of *Lonchocarpus utilis* and *L. Urucu* indicate that the latter species is less toxic than *L. utilis*.

Several varieties of *Derris* and *Lonchocarpus* grown at four altitudes varying from 80 to 3,300 ft. showed consistent and significant decrease in percentage of insecticidal constituents as the altitude increased. At all elevations MG 8 (*D. elliptica*) showed greatest insecticidal value.

Sweet potato. Details are given of flowering and percentage seed set in 13 F_1 hybrids between Jersey varieties and moist-fleshed types. It is hoped that in many of the crosses effected recently, the *Fusarium* resistance of PI 153655 will be combined with the desirable tuber qualities of selected varieties; Orange Little Stem was used as pollen parent in numerous crosses.

Many Jersey varieties proved highly susceptible to the sweet potato weevil (*Cylas formicarius elegantulus*) during a recent epidemic at Mayagüez.

Coffee. In the seventeenth year of comparison the Javanese variety Columnaris outyielded the West Indian variety Puerto Rico.

Strophanthus. Preliminary trials with various species were undertaken in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Cinchona. A further survey of strains at Toro Negro (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2162) showed the same general trends in survival and growth; strains of *C. pubescens*, and hybrids in which this species appeared phenotypically dominant, proved most vigorous.

Sweet corn. The early maturity of several inbred lines from Connecticut was inherited by hybrids from crosses with USDA–34 inbreds (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1687); hybrids 50324, 50325 and 50326 showed superior quality and yielding ability.

Loss of vigour was demonstrated in S_2 inbreds of USDA–34 by comparison with the original USDA–34 stock.

2550 **Seventieth Annual Report of the New York State Agricultural Experiment Station, Geneva, New York 1951 :** Pp. 26.

Breeding and other projects are listed. The following activities are among those reported more fully:—

Small fruits. The strawberry varieties Essex, Empire and Erie and the blackberries Hedrick and Bailey were distributed for more extensive trial (cf. Abst. 1420).

Tomato. Selections resistant to leaf blight, blossom end rot, anthracnose and *Verticillium* wilt have been developed; they will be used in crosses with the best commercial varieties, none of which shows a satisfactory degree of disease resistance. An early maturing, high yielding strain particularly suitable for the manufacture of tomato paste and purée is to be released.

Bean. A selection specially developed for canning has reached an advanced stage of seed increase; it is disease resistant and bears round, deep green and white-seeded pods.

2551 **Science and the land. The 72nd Annual Report of the New Jersey Agricultural Experiment Station, 1950-51** : Pp. 126.

Some breeding and other projects are listed. Activities reported in detail include the following:—

Maize. Single and double hybrids showed differential responses to postemergence applications of 2,4–D, tendency to lodge being more affected than yield.

Lucerne. Among the introductions tested, a line from Saudi Arabia was of particular interest on account of its marked pubescence and apparent resistance to leafhopper. Selection for bacterial wilt resistance continued. Use of seedling vigour as a criterion of selecting for yielding ability of the mature plant is giving encouraging results.

Apple. Breeding for scab resistance is in progress.

Tomato. The new variety Queens, from a cross between Valiant and Rutgers, has been developed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1420).

Sweet corn. Breeding aims at the production of hybrids for the fresh market which are relatively early, hardy, high yielding, attractive in appearance and taste, tender, resistant to smut and wilt and satisfactory for seed

production. The best so far developed is the experimental hybrid 101; it is to be extensively tested.

2552 **The Ninth Annual Report of the governing body of the Institute of Agriculture, Animal Husbandry and Dairying, Anand, for the year 1948-49** : Pp. 33.

Reference is made to selection in progress for improved varieties of sorghum, *Cyamopsis tetragonoloba*, cumin, fennel, chilli, *Sesamum*, tomato, egg plant and okra.

2553 **Progress of Agricultural Research. Sixty-fourth Annual Report of the Director, Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1951** : Pp. 147.

Wheat. Many new strains showing improved disease resistance and straw characteristics are under observation. Special attention was given to lines whose leaf rust resistance was derived from variety 3369–10; this wheat is nearly immune from all the races with which it has so far been tested. A study was also made of material with Hessian fly resistance originating from PI 94587 (*Triticum durum*), the resistance of which is effective against all races of the fly so far discovered.

Oats. Progress was made in developing spring varieties resistant to races 45 and 57 of crown rust and suitable for replacing Clinton and Benton. Several selections from Clinton x Boone-Cartier, Nemaha x Clinton-Boone-Cartier and Benton x Clinton-Boone-Cartier excelled Clinton and Benton in both yield and grain quality in the 1950 tests. The winter oats Clinton x Forkedeer and Clinton x Hairy Culberson showed superior hardiness in southern Indiana. They are resistant to the old races of crown rust but susceptible to races 45 and 57. They show improved strength of straw compared with Forkedeer and Fulwin. Back-crossing of these new hybrids for the introduction of resistance to races 45 and 57 continued.

Maize. The dent hybrids Ind. 803A, Ind. 686A, Ind. 680A and Ind. 501A were approved for certification (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2468).

At least four loci, *wx*, *su*, su_2 and *du*, are involved in changes in the ratio between amylose and amylopectin contents. True-breeding stocks have now been developed which have 0 to 65% amylose content, a trace to over 40% water-soluble polysaccharides and 10 to over 70% starch. In most stocks amylose and starch contents are inversely related. This material should be valuable in breeding for increased amylose content and in genetical studies.

Progress is reported in breeding for resistance to *Helminthosporium turcicum*, using Mo.21A as the source of resistance.

Forage grasses and legumes. Data from self-pollinated progenies of timothy appear to be satisfactory as a basis for clonal selection and prediction of polycross performance. The characters of the parental clone itself are a poor indication of the performance of either its selfed or polycrossed progeny.

Red clover breeding includes an attempt to combine resistance to northern and southern anthracnose.

In the improvement of birdsfoot trefoil a second cycle of maternal line selection was completed.

The production of high yielding synthetics resistant to wilt and leaf spot is one of the aims of lucerne breeding. The relationship between selfed and polycross progenies in the evaluation of breeding material is under investigation. Selection for resistance to spittlebug and leafhopper is giving encouraging results. Using an improved method of analysis, lucerne selections were found to show a methionine content ranging from 72 to 86 mgm. per grm. of total nitrogen with an average of 84 mgm. Although not very promising, the data are being used in an attempt to breed strains with increased methionine content.

Potato. Cherokee, developed from a cross made by breeders of the US Department of Agriculture between seedlings X 96–56 and X 528–170, was released cooperatively (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2775 and Vol. XXII, Abst. 504).

Apple. In 1950 seedlings from some crosses made in 1946 and 1947 for scab resistance fruited. This habit of early fruiting is derived from *Malus floribunda* and other *Malus* spp. used. The habit is not entirely lost in further crosses, as for instance, in (Rome Beauty x *M. floribunda*) x Jonathan.

Melons. Water melon breeding aims at developing a variety with green rind, red flesh, rounder shape, black seed and resistance to *Fusarium* and anthracnose. Musk melon breeding included further selection and sib-crossing of aphid and mosaic tolerant strains.

Tomato. Strains of the commercial type with 10 to 15 times the normal content of β carotene are available; their quality however requires improvement.

Studies on the inheritance of carotenoid pigments continued. The gene *R* is essential

for the production of any carotenoid pigment in quantity. *T* determines the conversion of the mixed pigments in the Jubilee type of system to the normal lycopene production of red tomatoes. A gene designated *B* is responsible for high content of β carotene. Plants with fruits having a high content of β carotene must possess *R*, *T* and *B*. *R* and *T* are dominant both chemically and phenotypically. Plants with fruits containing almost pure β carotene may be heterozygous for *R* and *T* but must be homozygous for *B*.

In breeding for high content of vitamin C, selections with fruit of useable size and with about double the normal amount of vitamin C were obtained.

In the 1950 test of F_1 and F_2 hybrids in comparison with varieties, F_1 Indiana Baltimore x Gem gave an outstandingly good total yield.

In a trial of hybrids involving lines resistant to *Fusarium* wilt, it was found that in general the best hybrids as regards yielding ability were derived from crosses between parents both giving high yields. Only 2 of the 11 hybrids studied produced peak pickings earlier than either parent.

Progress is reported in breeding for resistance to *Septoria* leaf spot and immunity from *Fusarium* wilt, using *Lycopersicon hirsutum* and Red Currant (*L. pimpinellifolium*) as sources of resistance, respectively. Promising selections combining *Septoria* resistance and *Fusarium* immunity have been developed by individual selection and bulk breeding.

Beans. In snap bean breeding attempts are being made to develop a bush variety with pods similar to those of the pole bean Blue Lake, and also a variety of the Blue Lake type better adapted to Indiana.

Soya bean. In a study of the cross Lincoln x Mandarin (Ottawa) a high degree of association has been found between generations with respect to maturity, height and yield. The inheritance of gray hilum discovered in the same cross received attention.

Sweet corn. Plans for the release of inbred G 8, the pollen parent of the new hybrid Hoosier Gold (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2281 and 2468), were completed. The seed parent of this hybrid is C 30, released by the Connecticut Agricultural Experiment Station.

Popcorn. Several experimental hybrids show promise. In the development of inbreds, seldom grown varieties such as Amber Pearl, Baby Golden and Early Yellow, have been used in order to increase the genetic diversity of inbreds available for hybridization. Some of the new lines combine well with Supergold and South American inbreds. In order to prevent contamination of popcorn seed fields by dent maize, a factor preventing fertilization by dent varieties has been transferred to Supergold inbreds used as female parents.

2554 **Agricultural Progress through Research. Annual Report of the North Dakota Agricultural Experiment Station.**
Sta. Bull. 1952 : No. 371 : Pp. 103.

In addition to varietal trials of rye, barley, maize, lucerne, sweet clover, flax, apple, onion and soya bean the following research is recorded:—

Wheat. Resistance to race 15B of *Puccinia graminis* was found in selections from a cross between Lee and a sister selection of Mida designated Ns. 3264; preliminary studies indicate that the resistant selections have good flour quality and high yielding capacity.

The most rust resistant wheats from the world collection have been crossed with locally popular varieties. Under greenhouse conditions two crops are being grown each year.

Oats. Selections from hybrids involving Santa Fe, Landhafer and Joanette have shown a higher degree of rust resistance than the parent varieties.

Forage grasses. From some 400 lines of Sudan grass showing wide variation in hydrocyanic acid content, disease resistance and date of maturity, several promising selfed and open-pollinated selections were made.

Potato. A selection designated ND 457 appears to be immune from virus Y under both greenhouse and field conditions. Its tubers have a higher specific gravity than commercial varieties grown locally.

Squash. An analysis of the F_2 of Bush x Buttercup has shown that the bushy growth habit is partially recessive to the vine type. A few offspring were completely bushy and some retained the bushy habit until late in the season when short vines developed; the majority produced trailing vines similar to those of Buttercup. Hybridization is in progress to combine the bushy habit with good fruit quality.

Tomato. An early maturing selection from Bounty x Valiant (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1693) has been named Cavalier. It is superior to both parents in respect of plant vigour, earliness and fruit size and shape, but total yield is slightly less.

Sweet corn. Miniature, an early maturing hybrid with quality similar to that of Golden Bantam, has proved outstanding in local trials and has been released to growers. Two consecutive crops will mature in a single season.

2555 **Report 61 of the Agricultural Experiment Station, University of Wyoming 1950-51** : Pp. 48.

Yield trials of varieties of wheat, oats and barley are reported.

Potato. Some 200 selections have been made for red-skinned tubers with resistance to scab and ring rot. Several promising seedlings have excelled standard commercial varieties in yield of US No. 1 tubers and are of good cooking quality.

Beans. A few lines with considerable resistance to bacterial blight have been developed.

2556 **Oregon's agricultural progress through research. 1951 Annual Report of the Oregon Agricultural Experiment Station.**
Sta. Bull. 1952 : No. 508 : Pp. 80.

Trials with varieties of potato, fruits, nuts, onion, cantaloupe, squash, cucumber, bean and sweet corn are reported.

Oats. Shasta (cf. Abst. 1114) has been released.

Forage legumes. Observations are reported concerning the pollinating activity of bees in relation to the percentage seed set of Ladino clover, red clover and *Lotus*.

Granger, a new broad-leaved strain of *L. corniculatus* developed from seed introduced from England (cf. Abst. 2016), has consistently produced higher forage yields than other forms of *Lotus* grown locally. The new strain shows vigorous seedling development, readily recovers from cutting and is long-lived; its forage is both palatable and nutritious.

Tomato. Crosses were made between the English introduction Puck (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 7) and a number of American varieties in an attempt to incorporate in the latter the unusual fruit setting ability of Puck at low temperatures experienced in field plots in early spring.

Bean. Blue Lake pole bean has been crossed with varieties of bush bean in order to improve the quality of the latter.

2557 Labor de la Dirección General de Fomento Agrícola en el año 1950. Memoria. **(Work of the General Department of Agricultural Improvement in the year 1950. Report).**
Bol. Produc. Fomento Agríc. 1951 : **3** : No. 25 : 2–125.

The report contains information regarding the new varieties of cereals and linseed that have been submitted for inscription, those admitted, those cancelled, and those maintained in the register; variety tests with a number of species of forage plants; seed multiplication of selected varieties of cotton, flax, hemp and other fibre plants; the most popular varieties of sugar cane; and crossing and selection work with groundnut, safflower, sesame, soya and other oil plants and peppers.

2558 **Notes on current investigations, July to September, 1951.**
Malay. Agric. J. 1951 : **34** : 209–25.

Tea. Study of 264 field-selected bushes at Cameron Highlands continued.

Cacao. Among the field trials of Trinitario clones, the trial of East Indies and West African clonal seedlings is progressing satisfactorily; differences in the vigour of the East Indies progenies are marked. Trinitario selections on the Kinrara Estate have been selfed to produce legitimate progenies. In comparative trials, Amelonado is decidedly more vigorous than unselected Trinitario but less vigorous than some progenies from selected Trinitario parents.

Oil palm. Dumpy palms gave outstandingly high yields among the pedigree progenies. Nurseries of new legitimate dumpy seedlings have been established. Pollen has been collected from two fertile palms of the pisifera type for breeding purposes.

Soya bean. Selection of recent introductions from Java and trials of selections obtained earlier continued.

2559 Smith, H. C.
Annual Report of the Department of Agriculture, Tasmania 1950-51 : Pp. 44.

Trials of varieties of the following crops are reported: oats, barley, potato, linseed and peas, together with:—

Wheat. Further reference is made to the new variety Macquarie, released from the Cressy Research Farm (cf. Abst. 240).

Individual selections have been made from 15 crosses which have undergone 6–10 generations of continuous bulk selection. Hybrid populations from more recent crosses are being grown as bulk lines.

At Sassafras, where an epidemic of stem rust produced severe symptoms on many commercial varieties, three selections from crosses involving Hope showed superior rust resistance; Hope x Braemar Velvet outyielded the heavily infected

standard, Pinnacle, by over 15 bushels per acre.

Forage grasses and legumes. At the Cressy Research Farm a promising selection of *Dactylis glomerata* is under observation.

Two further hybrids of *Trifolium subterraneum* have been selected for trial. The Yarloop White Seeded variety has exceeded other strains of subterranean clover in autumn and winter production at Flinders Island and Smithton.

2560 DE HAAN, H.
Vaktijdschriften op het gebied van de plantenveredeling. (**Scientific journals in the field of plant breeding**).
Euphytica, Wageningen 1952 : **1** : 60–61.

The chief journals, published in Holland, Sweden, England, France, Germany, Portugal, India and the USSR, for the use of plant breeders and geneticists, are noted.

2561 II Reunião Latino-Americana de Fitogeneticistas e Fitoparasitologistas. (**Second Latin-American Congress of Plant Breeders and Phytopathologists**).
Rev. Agric. S. Paulo 1952 : **27** : 118–26.

Under the auspices of the Rockefeller Foundation and the authorities of the State of São Paulo, the meeting took place from 30 March to 8 April 1952 in Brazil. In the inaugural address E. C. Stakman spoke on the need for international cooperation in the study of disease resistance in plants. Some 150 papers on a wide range of special subjects were presented, visits to a number of technical institutions were accomplished, and plans made for a third congress in 1953.

2562 WELLENSIEK, S. J.
The theoretical basis of the polycross test.
Euphytica, Wageningen 1952 : **1** : 15–19.

Calculations are given demonstrating that recognition of desirable genotypes by the polycross technique has a sound theoretical basis. It is pointed out that polycrossing is essentially a procedure of testing rather than a complete method of breeding; use of the term polycross test instead of polycross method is therefore advocated. The term combining ability may mean identity or at least similarity of genotype for the selected character; on this basis the high degree of true breeding of high yielding synthetics is explicable. The applicability of the polycross test depends upon the possibility of preserving simultaneously the genotypes of the plants tested (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1761). Use of the polycross test in back-crossing cross-fertilizing species, when the character to be transferred is recessive, is mentioned.

2563 **Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, 17 August–6 September 1949, Lake Success, New York.**
Vol. VI. Land Resources. 1951 : Pp. 629.

Plant Breeding. (*pp. 263–308*).

Frankel, O. H. Development and maintenance of superior genetic stocks. (*pp. 274–79*).

The very considerable economic benefits of crop breeding, with relatively little effort and expenditure on research and introduction in agricultural practice, are discussed. In view of the importance of collections, the FAO scheme of cataloguing genetic stocks should be supported and further developed, although it is criticized on the grounds that at present it makes no provision for collection and classification in nonparticipating and undeveloped countries, or for assistance in establishing world collections. It is argued that breeding for resistance to factors limiting yield is usually easier and more economical than breeding for directly increased yield. Several approaches for increasing the efficiency of breeding for yield increase are surveyed, and a fuller understanding of the nature of yield characters is advocated, with greater contributions from physiologists and biochemists. A general assessment is given of the potentialities of improvement by inducing mutations by X rays and other means, doubling the chromosome number and interspecific and intergeneric hybridization. In considering problems of varietal maintenance, the view is expressed that in self-fertilized crops too much attention had been given to purity. Finally, comments are made on the benefits likely to accrue from breeding in underdeveloped regions.

Robb, W. Development and maintenance of superior genetic stocks. (*pp. 280–81*).

Suggestions are made concerning methods of developing and maintaining genetic stocks of the chief crops with which the Scottish Plant Breeding Station is concerned, viz. cereals, field beans, potatoes, bred strains and regional races of cross-fertilizing herbage plants, *Brassica* crops, mangold and sugar beet. In the case of the wild and cultivated *Solanum* species and varieties indigenous to Central and South

America, it is suggested that a world collection in one of the South American countries would greatly facilitate further exploration of the potentialities of these forms in potato breeding.

Dorst, J. C. Notes on developing and maintaining high-yielding crop plants. (*pp. 281–84*).

Notes are presented on the following work at the Wageningen Institute of Plant Breeding, Netherlands: testing cereals for winter hardiness by observing their behaviour in spring sowings; colchicine-induced tetraploidy in rye and other crops; use of *Solanum demissum, S. chacoense* and other species in potato breeding; the technique of promoting flowering in the potato varieties Bintje and Eersteling by grafting and tuber removal, respectively; and procedures of determining alkaloid content in breeding and seed production of fodder lupin. A new method of colchicine treatment is referred to as a "short, energetic procedure (high concentration and temperature), which increases the percentage of tetraploids obtained from the mixoploid plants."

Pal, B. P. Development and maintenance of superior genetic stocks at the Indian Agricultural Research Institute, New Delhi. (*pp. 284–85*).

An account is given of the collections at the above institute and its substations, and of the methods of maintenance employed; wheat, maize, potato and sugar cane are referred to in particular. Mention is made of the project of crop introduction recently initiated by the institute.

Goulden, C. H. The Canadian system of collecting and maintaining genetic stocks of cereals. (*pp. 286–89*).

Methods of collecting and maintaining genetic stocks now being put into operation for cereals, flax and peas in Canada are described. The problems of such a system involve two main phases: (1) organization and (2) maintenance. The Cereal Division Laboratory at Ottawa is acting as a central agency for the collection, maintenance and distribution of all genetic stocks; other stations are used for the maintenance of stocks unsuitable for reproduction at Ottawa. Charts illustrate the flow of material from the breeder to the Cereal Division and thence to breeders according to request. Some problems of the technique of the second phase are discussed. A method is being tried out which, although not ideal for the maintenance of stocks in their original condition, enables a large number of stocks to be handled with a minimum of labour and equipment.

Bøgh, H. Plant breeding—development and maintenance of superior genetic stocks. (*pp. 289–92*).

The economics of crop breeding in Denmark is analysed. Breeding is carried out entirely on private initiative. Some problems encountered in breeding cross-pollinated species are outlined, the polycross technique being compared with other methods. Breeding of such species should involve plants of diverse origins, sharp differentiation of the components of the initial material, and evaluation of combining ability under a wide range of environmental conditions. The breeder should aim at developing varieties most suitable for conditions conducive to high yields, such as early sowing in sugar beet. Cross-pollinating crops, produced by modern methods of family breeding, and self-pollinating species do not always maintain their yielding capacity under multiplication. Original seed should therefore be purchased by the seed firms from the breeders each year. In this way the breeder would also be paid for his work.

Åkerman, Å. The improvement of the yield of cereals in Sweden due to plant breeding. (*pp. 297–301*).

Information is given on the yield increases of cereal crops obtained in Sweden during the period 1885 to 1935 as a result of breeding; the annual profit from crop breeding to-day is estimated as 100 to 150 million Swedish crowns. The possibilities of further improvements in yields of cereals by breeding and manurial dressings are discussed.

Orellana, A. R. Crops suitable for the large semiarid areas in the state of Lara. (*pp. 301–03*).

Some types of sisal and pineapple are suitable for cultivating in the semiarid region north of Barquisimeto, Venezuela. The establishment of a breeding nursery and experimental station for the improvement of these crops is advocated; the activities of the station should include genetical investigations.

Cardon, P. V. and Erlanson, C. O. Adaptation of crops to new environment. (*pp. 292–96*).

Examples are given of the role of introductions in crop production and breeding in the United States during the past fifty years. Recently five expeditions have been carried out by American breeders to collect: (1) high altitude cereals in the Himalayas as possible winter

cover crops, oil-producing species and several other kinds of plants in India; (2) tuber-bearing *Solanum* spp. in southern Mexico, for use in potato breeding for disease resistance; (3) wild and cultivated cottons in northern Guatemala and southern Mexico; (4) peanuts and forage plants in South America; and (5) new material for industrial and other purposes in Turkey. It is emphasized that the breeders in the United States have a wealth of new improved varieties to offer other countries, but since most of the crops have been introduced, they have little raw material to exchange. Breeders in other countries are in most cases likely to derive the maximum benefit from American varieties by crossing them with locally adapted varieties.

Summary of discussion. (*pp. 304–08*).
Topics discussed included O. H. Frankel's criticism of the scope of FAO with regard to collections; the American Institute of Crop Ecology and its collation of information on climatic analogues; introduction in relation to the problems of disease; progress made in the preparation by FAO of catalogues of genetic stocks; and problems connected with the introduction of varieties into underdeveloped countries.

Protection of crops and grasslands. (*pp. 309–39*).

Stakman, E. C. The control of plant diseases. (*pp. 319–24*).
A general discussion of disease control by resistant varieties is included. The importance of more information on physiological races and on the genetics of both the host and pathogen is stressed, as is also the international nature of many of the problems of crop resistance.

Taskhir Ahmad, Hasanain, S. Z. and Sattar, A. Some popular methods of plant diseases control in Pakistan. (*pp. 327–29*).
Breeding for disease resistance in sugar cane, potatoes and *Cicer arietinum* is referred to.

Hendrix, J. W. Disease control of agricultural crops in Hawaii. (*pp. 330–33*).
A brief survey is included of breeding for disease resistance in sugar cane, Napier grass, tomato and other crops in Hawaii. Use of selections of Napier grass (*Pennisetum purpureum*) x Merker grass (*P. Merkeri*) resistant to eye spot (*Helminthosporium Sacchari*) has virtually eliminated the disease in plantings of Napier grass (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 477).

Bouriquet, G. Control of plant diseases in the French Overseas Territories. (*pp. 333–36*).
Examples of the importance of resistant varieties of sugar cane and other crops are cited. Mention is made of an outstandingly vigorous and productive hybrid obtained in Madagascar from a cross between *Vanilla planifolia* and *V. Humblotii*. On account of the drought resistance of the latter parent, the hybrid may be of value for regions of insufficient rainfall.

Seeding and restoration of natural grazing lands. (*pp. 529–60*).

Nilsson-Leissner, G. Testing new plant materials for re-vegetation of grazing lands. (*pp. 530–34*).
Natural selection and competition are discussed with particular reference to the problems of breeding, testing and propagation of new strains of species suitable for the revegetation of grazing lands. Comments are made on the results obtained in Scandinavia from the breeding of strains with high chromosome numbers, inbreeding and crossing of inbred lines, and induction of mutations by X rays and other agents. The importance of satisfactory methods of commercial seed production is emphasized.

Corkill, L. The breeding of pasture plants in New Zealand. (*pp. 534–40*).
The chief aim has been increase in leaf production and in the seasonal spread of this production. The best ecotypes of the main pasture species in New Zealand have been improved by breeding; additional strains have also been developed for short rotation and temporary pastures. An account is given of pedigree strains of the following: perennial and Italian ryegrass, short-rotation ryegrass (derived from *L. perenne* x *L. multiflorum*), cocksfoot, timothy and white and red clover. The efficient utilization of pedigree strains to increase production and the effect of improved pasture strains on yields of subsequent wheat crops are discussed.

Keller, W. Testing new plant materials for re-vegetation of grazing lands. (*pp. 541–44*).
Numerous tests of the adaptation of species to the natural grazing lands in the western half of the United States have indicated that for reseeding much of the area, introduced species are superior to native ones. Ecotypes differ considerably, suggesting the need for more introductions of important exotic species. Seventy strains of grasses are now under test in the local

Plains and Intermountain region, consisting of mass or single plant selections, introductions, and collections from native stands within the range area. Grass breeding is now mainly concerned with the direct hybridization of selected plants, instead of the production of selfed lines for crossing. The present position of seed production of grasses is analysed.

2564 PALAMARČUK, A. S.
(The selection of biologically valuable seed of agricultural plants).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 51–56. [Russian].

Agrobiological theories on seed selection, including those on heritable differences between the seed produced at different positions on the plant, are expounded. The principle of selection of the best seed in cereals, legumes, root crops, Compositae and Umbelliferae consists in selecting the seed from the inflorescences first developed by the plant. Notable exceptions are tomatoes, which produce better seed upon the second bunch than upon the first and third bunches, and cucumbers, which produce better seed upon the first laterals than upon the central vine.

2565 TIRELLI, M. and SANTINI, L.
Varietà di piante coltivate in Italia resistenti a malattie e a cause avverse. **(Varieties of plants grown in Italy that are resistant to diseases and to adverse influences).**
Boll. Staz. Pat. Veg. Roma 1949 : **7** : 217–68.

Hybridization and the induction of polyploidy can be used to produce resistant plant forms; but pure lines resistant to certain diseases have also been evolved by natural selection. As a contribution to research on such forms, the authors have compiled, from published and unpublished sources, a classified list of 302 varieties of woody plants and 295 varieties of herbaceous plants. The varieties are alphabetically arranged under the various species of plants and the degree of susceptibility or resistance to the particular disease or parasite is indicated while the source or sources of information are given in a separate column.

2566 KOFOED, A. DAM
51. Beretning om Planteavlsarbejdet i Landboforeningerne i Jylland. **(Fifty-first report on plant cultivation work under the agricultural associations in Jutland).**
Skanderborg 1951 (1952) : Pp. 534.

The local field experiments carried out by the numerous agricultural associations in different parts of Jutland are recorded. The crops tested included wheat, rye, barley, oats, herbage plants, meadow grasses, root crops, onions, hybrid maize, potatoes, flax and peas.

2567 **Progress Report of the Dominion Experimental Substation, Smithers, British Columbia, 1938–50** : Pp. 44.

Cereals. Variety trials of wheat, oats and barley have been carried out. Among the spring wheats tested, Saunders is the most suitable, on account of its earliness. Dawson's Golden Chaff has given the highest yields in the winter wheat trials; its superiority is largely due to its resistance to snow mould. Ajax and Beaver are the highest yielding varieties among the early maturing oats tested, and are likely to replace the late maturing Victory. The early barley Olli has so far appeared the most suitable for general use; it has however the disadvantage of rough awns.

Forage grasses and legumes. The results of variety and strain tests of timothy, brome grass, lucerne and red clover are reported. Of the lucerne varieties studied, Grimm and Ladak have given an outstandingly good performance in all tests. The new variety Rhizoma has so far failed to show its rhizomatous character (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1479).

Fruits. Varieties of small fruits most successful at Smithers are listed. The crab apples Columbia and Osman have shown hardiness, high yielding capacity and suitability for jelly making. Of the named varieties originating from apple x crab hybrids, Rosilda and Trail have exhibited hardiness.

Vegetables. Notes are given on the performance of varieties of many kinds of annual vegetables.

2568 **1951 variety performance trials of field crops.**
Univ. Ga. Agric. Exp. Sta. 1951 : Pp. 24.

The results of varietal trials of maize, wheat, oats, barley, cotton and flue-cured tobacco in Georgia are reported.

2569 **Thirteenth progress report of the Alaska Agricultural Experiment Station, 1948** : Pp. 11.

Results of adaptability trials of introduced varieties of cereals, forage grasses and legumes, potato, small fruits and numerous vegetables are reported from stations at Palmer, Matanuska, Fairbanks and Petersburg. Several local potato selections proved superior to

commercial varieties under Alaskan conditions; seedlings were obtained from 49 crosses.

2570 STOFFELS, E.
Het landbouwkundig onderzoek in Belgisch Kongo. (**Agricultural research in the Belgian Congo**).
Landbouwk. Tijdschr., Wageningen 1952: **64** : 298–303.

An account is given of the organization and scope of the work carried out by the various constituent research stations of the National Institute for Agricultural Research (INEAC) in the Belgian Congo (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 877 and Vol. XXII, Abst. 2542).

CEREALS

2571 SELENIUS, H.
Ålands Försöksfält år 1949/1950. (**The Åland Experimental Plots 1949/1950**).
Ekenäs 1950 : Pp. 9; 1951 : Pp. 18.

Trials of spring and winter cereals and of peas, rape and potatoes were carried out to ascertain which varieties were best adapted to conditions in the Åland Islands. Nearly all the varieties were produced by Finnish or Swedish breeders and are known to readers of *Plant Breeding Abstracts*.

2572 OEHLER, E.
Die Züchtung der Getreidearten und die Produktion und Anerkennung von Getreidesaatgut in der Schweiz. (**Cereal breeding and cereal seed production and certification in Switzerland**).
Eidgenössische Versuchs- und Samenuntersuchungsanstalt, Lausanne (Mont Calme). Pp. 23.

After a general description of cereal cultivation in Switzerland, an historical account is given of the cereal breeding at the two Swiss agricultural research stations, at Zürich-Oerlikon and at Lausanne-Mont Calme. Starting with selection of land races, followed by hybridization with the best selections and introduced varieties, each station has produced a number of improved varieties of winter wheat, including Mont Calme 245 and Plantahof, the former superior in yield, the latter in baking quality; further crossing has led to Probus wheat, characterized by excellent standing capacity and a combination of high yield and quality. Spring wheat breeding consists mainly of crossing Huron with more rust-resistant varieties and testing awnless mutants and segregates from Huron x winter wheat crosses. The best of the *Triticum Spelta* selections is Oberkulmer Rotkorn [Oberkulm Red Spelt].

Selection from land races has led to a number of improved rye varieties, the best being Witzwil, which is however not equal to the new Petkus strains in yield. Among the products of winter barley breeding two varieties are mentioned, Argovia Z and Riniker, which, though 20% inferior in yield, ripen three weeks before Argovia and enable a second main crop to be grown. Very early spring barley selections include St. Croix. The early oat Soldanelle, from the cross Hâtive des Alpes x Daubeney, is still grown in the foot alps, other oats cultivated being all of foreign origin. The maize Rheintaler, improved by selection at Oerlikon, is grown in the Rhine valley, while elsewhere, mostly imported varieties are preferred.

The organization of seed production of improved cereal varieties in Switzerland is described.

2573 **Twenty-fifth Annual Report of the Grain Research Laboratory, 1951** (1952) : Pp. 80.

Part III deals with the results of analytical tests determining the relative quality of varieties of hard red spring wheat, amber durum wheat and malting barley submitted by Canadian and United States' plant breeders. Details are given of those varieties which showed sufficient promise to be selected for studying again the following year. These include the bread wheats CT 708 (Thatcher x S 615) and CT 918 (Regent x Canus); the durum variety DT 113 which equals Mindum in macaroni quality; and the malting barley U of M 43–1020. The American barley Harlan proved inferior to OAC 21 in malting quality and has been recommended instead as a fodder barley for irrigated conditions.

2574 STAKMAN, E. C.
Plant diseases are shifty enemies.
Science in Progress. Fifth Series. 1947: 235–79.

Surveys of the occurrence of new physiological races of flax wilt, stem rust of wheat, and maize smut in the USA emphasize the importance of permanent breeding programmes to develop crop varieties with improved disease resistance. Particular reference is made to the production of wheats resistant to race 15B of stem rust. Details are given of the wide range of pathogenicity shown by segregating progenies resulting from hybridization between mutant forms of *Ustilago Zeae*; this is further complicated by ease of recombination between

biotypes. A key for identifying physiological races of *Puccinia graminis* var. *Tritici* on the basis of their pathogenicity on 12 differential varieties of wheat is included.

2575 Guyot, L., Massenot, M., Montégut, J. and Saccas, A.
A propos de la rouille jaune des Graminées (*Puccinia glumarum*). [**Concerning the yellow rust of the Gramineae (*P. glumarum*)**].
CR Acad. Sci. Paris 1948 : **227** : 83–85.

Extensive study of spore and sorus characters of the rusts of cereals and wild grasses has thrown doubt on the validity of the distinction commonly made between *P. glumarum* and *P. dispersa* within the collective species *P. rubigo-vera*.

2576 Forlani, R., Ciferri, R. and Baldacci, E.
Suscettibilità alla "carie" (*Tilletia* spp.) di *Triticum* spp. con speciale riguardo alle razze italiane. Anni 1947–48 e 1948–49. [**Susceptibility of *Triticum* spp. to bunt (*Tilletia* spp.) with special reference to Italian varieties, 1947-48 and 1948-49**].
Notiz. Malattie Piante 1949 : No. 3 : 1–7. (Mimeographed).

Preliminary results are recorded of the reaction of the following species of cereals to a mixed infection of *Tilletia Tritici* and *Tilletia laevis*: *Triticum vulgare, T. sphaerococcum, T. Spelta, T. durum, T. turgidum, T. dicoccum, T. polonicum, T. monococcum, Aegilops ovata, Haynaldia villosa, Hordeum vulgare, Secale cereale, Agropyron glaucum* x *Triticum orientale,* and *Agropyron glaucum* x Lutescens 062.
All the late sown, soft wheats were more susceptible than the early ones; in the latter group, S. Pastore was the most susceptible, and in the late group, Inallettabile 210.
The single variety of *Triticum sphaerococcum* tested was susceptible, whereas the sole *T. Spelta* variety was not. The two varieties tested of *T. turgidum* were susceptible, while the variety Cappelli of *T. durum, T. polonicum* and the two varieties tested of *T. dicoccum* and *T. monococcum* were immune, as were also the *Agropyron* hybrids, *Ae. ovata, Hordeum vulgare* and *S. cereale.*
A slight amount of infection was observed only in 1947–48 on *Haynaldia villosa,* which, to the author's knowledge, has only once before been recorded as infected by bunt, in Serbia.

2577 Pfeiffer, R.
Ergebnisse der Admonter Getreide- und Silomaissortenversuche 1950/51. (**Results of the Admont cereal and silage maize variety trials 1950/51**).
VersErgebn. Bundesanst. alp. Landw. Admont 1951 : No. 14 : Pp. 58. (Mimeographed).

The results are shown of one year trials with varieties of winter and spring barley, winter and spring wheat, winter rye and oats. Generally the characteristics observed included: yields of grain and straw, 1000 corn and hectolitre weights, crude protein content, growth type in the young stage, date of shooting of the ear, ripening time, plant height, overwintering and resistance to lodging and diseases.
In the silage maize trials American hybrids and Austrian varieties, including six new selections, were tested. The results of the trials give information on (1) yields of green and dry matter, (2) crude protein content, (3) plant height, (4) number of ears, (5) proportion of ears by weight, (6) diameter of stem, (7) size and number of leaves, (8) development from shooting to maturity, (9) amount of tillering and (10) resistance to lodging and disease. Yield analysis and calculation of correlations showed that in some cases the exact determination of the factors producing yield, i.e. (4), (5), (6), (7) and (8) above, gives useful information concerning the causes of high or low yields.

2578 Moran, C. H. and Junkins, S. C.
Small grain variety trials 1946-50.
Bull. Me. Agric. Exp. Sta. 1952 : No. 498 : Pp. 19.

The results of recent variety tests on wheat, oats and barley in Maine are summarized. Descriptions are given of varieties found suitable for commercial cultivation.

WHEAT

2579 Salmon, S. C. and Bayles, B. B.
New wheat varieties gain ground.
Crops and Soils 1952 : **4** : No. 7 : 22–25, 38.

A botanical survey is given of changes in the wheat variety situation in the USA and of reasons for these changes (cf. *Plant Breeding Abstracts,* Vol. XXI, Abst. 2556).

2580 Matsumura, S.
Radiation genetics in wheat. I. Chromosome aberrations in einkorn wheat induced by irradiation.
Cytologia, Tokyo 1951 : **16** : 201–11.

At Kyoto University, Japan, dormant grains of

Triticum monococcum var. *vulgare* ($2n = 14$) exposed to increasing X ray doses ranging from 2700 to 13500 r. gave rise to seedlings producing pollen mother cells in which the frequency of chromosomal aberrations, especially reciprocal translocations and subsequent rings of 4 chromosomes, increased in parabolic relationship to the dose. Aberration frequency decreased when a constant dosage of 8100 r. was given at increasing wave lengths. It is probable that such variations in the frequency of aberrations depend on differences in the distribution of ionization in the nucleus when varying wave lengths are used. X rays of high wave length possessing a large concentration of ions induce many closely adjacent breaks which reunite without translocation or inversion; observable aberrations are therefore less frequent than those occurring as the result of widely scattered chromosome breakages caused by X rays of shorter wave length in which ions are relatively less concentrated.
Data concerning the relationship between aberration frequency and dosage of γ rays are in agreement with the above conclusions.
It is pointed out that differences in ionization distribution can be used to interpret the observations of Giles and Conger (cf. Abst. 1629), who attribute a high mutagenic efficiency, in respect of producing interchanges, to fast neutron irradiation of low average energy.

2581 Jones, I. K. (pseudonym).
The development and production of grains in the U.S.S.R.
Seed World 1952 : **70** : No. 7 : 10, 40.
Brief descriptions are included of some outstanding varieties of winter wheat and winter rye.

2582 Fajersson, F.
Kärnvårvete II—en sammanställning av aktuella försöksresultat. (**The spring wheat Kärn II. A survey of recent experimental results**).
Agri Hortique Genetica, Landskrona 1952 : **10** : 75–96.
An account is given of the above wheat (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 819) and its performance in Sweden, Denmark, Norway and other countries of Europe since it was first put on the market in 1947 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 197). Comparisons of Kärn II [Kernel II] with many of the newer varieties, e.g. Brons, Ella, Pondus and Rival, are recorded, with special reference to early ripening, protein and gluten content of the grain, baking quality, and resistance to lodging, mildew (*Erysiphe graminis*), leaf rust and stem rust.

2583 Briggs, F. N.
Registration of improved wheat varieties, XIX.
Agron. J. 1952 : **44** : p. 155.
Kiowa (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2750) has been approved for registration in the USA.

2584 *Feekes, W.
Enkele aspecten van de tarweveredeling. (**Some aspects of wheat breeding**).
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 1951 : 359–90.
The relative value of losses to wheat production in the Netherlands due to shattering, sprouting in the ear, lodging, winter injury and diseases is estimated. These losses could be greatly reduced by breeding. The desiderata for a wheat breeding programme are listed. A world collection of varieties is required and an international scheme for their systematic comparison might be organized.
The "breeder's eye" is discussed at length and compared as an effective instrument with a breeding technique based on the accumulation of statistical data. Barley is much more difficult to judge by eye than wheat, while oats is more easily classed in this way than barley. The possibility of postponing the expensive field trials to the end of the breeding work is mooted.

2585 Simonet, M.
Régularisation et augmentation de la fertilité chez certains *Aegilotricum*. I. *Aegilops ventricosa* x *Triticum Timophevii* [sic]. (**Regularization and augmentation of the fertility of certain forms of *Aegilotricum*. I. *Ae. ventricosa* x *T. Timopheevi***).
CR Acad. Sci. Paris 1948 : **227** : 1417–18.
A plant in which only one bivalent was formed at meiosis was obtained from the above cross. However two plants were obtained from it by open pollination, and one by back-crossing to *T. Timopheevi*. The two open-pollinated progeny had $2n = 40$ and $2n = 42$ chromosomes respectively. Bivalent frequency was higher in these plants and progeny were reared from the 42–chromosome individual. The backcross progeny consisted of one 42–chromosome plant,

* An extended summary of this paper is on file at the Bureau.

similar morphologically and cytologically to the 42–chromosome plant mentioned above. An F_3 generation was obtained by open pollination; the chromosome numbers varied from $2n = 29$ to 45, and fertility tended to increase. The hybrids are of interest for their rust resistance.

2586 CHIN, K.-C. and BLARINGHEM, L.
Modification des épillets dans l'hybride de blé *monococcum* x *vulgare*. **(Modification of the spikelets in the wheat hybrid *monococcum* x *vulgare*).**
CR Acad. Sci. Paris 1946 : **223** : 386–88.

Continuing his observations on the cross *Triticum monococcum* x *T. vulgare* (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 1439), the first-named author notes that spikelets with 2–3 grains occur with increasing frequency in the segregates of the *T. monococcum* type arising in later generations. A tendency was also noted for such segregates to bear spathulate heads due to denser growth at the apex of the spike.
The second author, in a note appended to the main paper, emphasizes the interest to breeders of the wild wheat species.

2587 OHLENDORF, A. and RUDORF, W.
Hibridación entre *Triticum aestivum* y *Agropyrum intermedium*. **(Hybridization between *T. aestivum* and *A. intermedium*).**
Genet. Iber. 1950 : **2** : 287–94.

Both parents in the cross had $2n = 42$ chromosomes. The F_1 plants were entirely self sterile but formed an average of 7 bivalents at metaphase. The back cross with wheat was very variable in its characters and the chromosome number varied from 40 to 60. After further back-crossing and selfing, certain hybrids of fairly high fertility were obtained in which the genomes of the two genera were to a certain extent combined. None were perennial but some were resistant to rust and mildew; studies of the gluten showed it to be quite different from that of wheat in some of the hybrids.

2588 OHLENDORF, A.
Zytologische Untersuchungen an Weizen-Quecken-Bastarden. **(Cytological investigations in wheat-couch grass hybrids).**
Züchter 1952 : **22** : 34–59.

Accepting the existing descriptions, by English and Russian investigators, of the F_1 generation from *Triticum vulgare* x *Agropyron intermedium*, the author here gives a detailed account of the cytological characteristics of the F_2, F_3 and F_4 generations, with special reference to the occurrence of chromosome pairing as an indication of homology.
In the formation of the F_2 plants, which arise from reduced or unreduced egg cells, pairing occurs between the homologous *Triticum* chromosomes and the value of $2n$ ranges between 43 and 63. The progeny of an F_2 plant derived from a reduced egg cell shows a tendency to regulate the chromosome number by eliminating gametes with high chromosome numbers.
Analyses of a few stabilized hybrid forms in the later generations indicate that the higher the number of normal *T. vulgare* pairs in the hybrid, the greater the fertility and constancy are likely to be.
In the writer's view, the manifestation of some *Agropyron* characters, such as resistance to brown rust or mildew, is based on a numerical and qualitative superiority of the *Agropyron* genes as compared with those of *T. vulgare*.

2589 JAKUBCINER, M. M.
(The question of finding rye grains in the ears of wheat plants).
Agrobiologija (Agrobiology) 1952 : No. 1 : 24–38. [Russian].

An examination of wheat grown in several districts of Transcaucasia and Dagestan supports Lysenko's thesis of interspecific conversions. Many of the ears of wheat investigated contained a single grain of the rye type. In a single instance, two rye grains were found in one wheat ear. The incidence of rye grains was more frequent in the ears of soft wheats than in those of hard wheat. The grains of the rye type gave either normal rye or normal wheat plants. The rye plants were fertile. In this they differed from two natural hybrids between wheat and rye, which were sterile.

2590 KARAPETJAN, V. K.
(Some new facts on the conversion of one species of cereal into another).
Agrobiologija (Agrobiology) 1952 : No. 2 : 29–44. [Russian].

Instances of conversion of *Triticum durum* into *T. vulgare*, *T. dicoccum* and *Secale cereale* and of rye into wheats with 42 chromosomes were investigated at Gorki Leninskie in material originating from Armenia. It is claimed that 63 rye grains were found in 190,214 ears of the soft winter wheats Ukrainka [Ukrainian], Alty-agač and Karmir-slfaat and the hard semiwinter wheat Apulicum. Similarly, two rye plants, found as impurities in wheat fields, had ears with one wheat grain each. These grains produced wheat plants with 42 chromo-

somes, while all other grains of the same ears developed into normal rye plants with 14 chromosomes.
The rye grains found in the ears of *T. vulgare* and *T. durum* gave normal rye plants capable of grain setting without pollination. Cytological analyses of these plants showed that their roots had 14 and their pollen grains 7 chromosomes.
A new form of soft wheat was obtained from hard wheat by sowing in late autumn. It had 28 and 42 chromosomes in its somatic and 14 and 21 chromosomes in its reproductive tissues. Two grains of the rye type found in *T. durum* ears produced *T. dicoccum* plants with 28 chromosomes.

2591 Enin, T. K.
(The conversion of Sary-Bugda into Gjuljgeri wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 24–28. [Russian].

In Dagestan, examination of the hard wheat Sary Bugda [Yellow Wheat] showed that some ears contained single grains of *Triticum vulgare*. These grains produced various forms of soft wheat, corresponding to the local population Gjuljgeri, frequently found as an impurity in fields of Sary Bugda. The so-called Dèstè method of selection, designed to maintain Sary Bugda in a pure state, is described. It consists of using the seed from subsidiary tillers after eliminating immature seed from the proximal and distal ends of the ear. Two productive soft wheats, Pseudo-Barbarossa 196 and Barbarossa 156, said to have spontaneously originated in a field of Sary Bugda and an improved strain, Sary Bugda Hordeiforme, have been selected. The latter shows resistance to bunt, smut and rust.
Reference is made to ear analyses of the soft wheat Pervenec [First-born]. Some of these ears contained rye seed, an occurrence attributed to interspecific conversion.

2592 Kuljčickiĭ, A. V.
(Vegetative hybridization of winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 74–75. [Russian].

Experiments on transmitting hardiness to Braunweizen [Brown Wheat], a variety with productive ears originating from Saxony, by vegetative hybridization are in progress at the Kaliningrad Breeding Station. Shoots of this *milturum* variety were grafted when 3–4 days old on stocks of local Petkus rye. The grafted material resembled Braunweizen but was more vigorous. The first seed generation showed extensive segregation. For instance, one family which gave 167 plants produced 95·2% plants of *milturum*, 2·4% of *velutinum* and 2·4% of *lutescens* type. The F_1 of the *velutinum* and *lutescens* types was early and produced long lax ears. The vegetative hybrids were more productive than Braunweizen because of their longer ears and better tillering capacity. The 1000 grain weight was less but the percentage of vitreous grains higher. All material is being tested for hardiness and resistance to diseases in the second seed generation.

2593 Rjurikov, N. A.
(The effect of external conditions upon inheritance).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 28–31. [Russian].

Changes, regarded as heritable, have been obtained at the Šatilovo State Breeding Station with variety 340 of *Triticum dicoccum* as a result of training upon soil dressed with large amounts of nitrogenous fertilizer. The trained material grew taller and produced longer ears with more productive spikelets per ear. Some forms showed resistance to brittle ear.
The seed from the additional florets, developed by the experimental plants, was grown upon rich organic soil under laboratory conditions. Several of the resulting plants differed morphologically from *T. dicoccum*, one plant being of *T. durum* var. *hordeiforme* type and two of *T. vulgare* type, resembling vars. *lutescens* and *erythrospermum* respectively.

2594 Sears, E. R. and Câmara, A.
A transmissible dicentric chromosome.
Genetics 1952 : **37** : 125–35.

The behaviour of a dicentric chromosome derived from an isochromosome for the short arm of chromosome VII of common wheat has been observed at meiotic and mitotic divisions. Data indicate that the relative weakness of the secondary centromere is not dependent on its location with respect to the primary centromere, but that it is an intrinsic characteristic (cf. also Abst. 2597).

2595 Kihara, H.
Substitution of nucleus and its effects on genome manifestations.
Cytologia, Tokyo 1951 : **16** : 177–93.

Successive back-crossings with two different aims are considered theoretically: (1) substitution back crosses carried out to transfer the

nucleus BB of one species to the plasma of species AA; and (2) restoration back crosses to transfer the genomes AA to the plasma of species AA. Experimental data are presented on back crosses of two types of hybrid: (1) between two closely related species, viz. *Aegilops longissima* (S^1S^1) and *Ae. Aucheri* (SS); and (2) between two closely related species, represented by *Ae. caudata* (CC) and *Triticum vulgare* [AABBDD (abbreviated to V)]. Substitution and restoration back crosses of *Ae. longissima* ♀ x *Ae. Aucheri* ♂ to *Ae. Aucheri* and *Ae. longissima* respectively were analysed with respect to chromosome pairing, fertility and morphology. Chromosome conjugation improved as the number of BC generations increased but the gain was much more marked in the restoration back crosses; seed fertility in the substitution back crosses remained below the level of fertility of normal *Ae. Aucheri*.

The hybrids *Ae. caudata* ♀ x *T. vulgare* ♂ had $2n = 28$ and presumably the genome CV. Data are included on the fertility and inheritance of spike colour in selfed and hybrid derivatives of an open-pollinated BC_2 plant. The selfed lines, maintained for several years, have the plasma-genome constitution $\alpha^cV^bV^b$ (α^c = *Ae. caudata* plasma, V^b = *T. vulgare* genome carrying genes for black spikes). Of particular interest are the black-yellow ear mosaics obtained from the cross β VV x $L^cV^bV^b$ (β = *T. vulgare* plasma, V = *T. vulgare* genome carrying genes for yellow spikes). The assumption of two mutant genes provides a plausible explanation of their origin but does not fully account for the segregation ratios.

2596 Medvedeva, G., and Bazavluk, V.
(The question of sterility of branching wheat).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **77** : 1099–102. [Russian].

Abnormal meioses were observed in Kahetinskaja Vetvistaja [Branching Kahetian], *Triticum turgidum* var. *Plinianum*, at the USSR Institute of Genetics. In analyses made in 1949 metaphases proceeded normally. In 1950, normal metaphases were less frequently observed; the chromosome number varied between 15 and 28 and the chromosomes were long and thin and had the appearance of somatic chromosomes. This was particularly the case with the peripheral florets analysed in 1950.

Anomalous meioses became very clearly apparent in the anaphases of the first division. Most frequently the chromosomes were located on the spindle in complete disorder and fragmentations, formation of bridges and lagging were observed. At anaphase the chromosomes had still the same somatic appearance and sometimes migrated to neighbouring cells. In some instances the lagging chromosomes were included in the daughter nuclei, in others they gave rise to additional micronuclei. The latter occurred most frequently in the florets on lateral rachillae and in the young pollen grains.

The second division was accompanied by fewer anomalies. No migrations of chromosomes from one cell to another were observed, although other aberrations occurred during anaphase.

2597 Sears, E. R. and Câmara, A.
Un cromosoma dicéntrico transmisible en trigo. **(A transmissible dicentric chromosome in wheat).**
Genet. Iber. 1950 : **2** : 239–56.

A detailed study of the behaviour of the dicentric chromosomes found by Sears (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1214) showed the primary centromere to be generally stronger than the secondary one. The dicentric was often involved in the formation of bridges but in most cases the two chromatids ultimately proceeded to opposite poles at meiosis. Frequent losses in the region containing the subterminal centromere occurred in somatic tissue, leading to sectorial plants containing various types of derivative monocentrics.

The possible origin of the dicentric is discussed (cf. also Abst. 2594).

2598 O'Mara, J. G.
Cytogenetic studies on *Triticale*. II. The kinds of intergeneric chromosome addition.
Cytologia, Tokyo 1951 : **16** : 225–32.

Cytological observations at meiosis in intergeneric hybrids between *Triticum vulgare* and *Secale cereale* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1586) have shown that in different hybrids parts of chromosome I of *S. cereale* have been added to the full complement of *T. vulgare*; these fragments are explained in terms of misdivision of a single univalent.

Two distinctive contributions from *S. cereale* producing an identical phenotypic expression in the form of a pubescent peduncle consist of: (*a*) the normal rye chromosome with a subterminal kinetochore and a pronounced secondary constriction in a median position; and (*b*) the long arm of this chromosome, possessing a terminal kinetochore. Plants carrying the very small telocentric chromosome representing the remaining short arm of (*a*) are morphologically

indistinguishable from normal wheat. Two other types of *S. cereale* fragments representing duplication of the long and short arms of (*a*) are found. The isochromosome which is a duplication of the long arm is identical, in phenotypic effect, with a bivalent composed of two (*a*) types, but an isochromosome involving two short fragments has no appreciable influence on the glabrousness of the normal wheat plant.
It is assumed that the long arm bears the factors determining pubescence; the possibility that the very small short arm might have some phenotypic effect if present in a larger proportion than that already observed is not, however, overlooked.

2599 Danjšin, T. E.
(Changes in the growth periods of spring wheats caused by external conditions).
Agrobiologija (Agrobiology) 1952 : No. 1: 149–51. [Russian].

The growth periods of several wheats became longer as a result of cultivation under Sahalin conditions. In more recent experiments at the Amur Breeding Station, the development of the perennial habit in the winter wheat Lutescens 329, the winter rye Žitkinskaja and a vegetative hybrid, Alabasskaja wheat on rye No. 12 (Vjatka x Žitkinskaja), has been investigated.

2600 Gassner, G. and Baumgarten, G.
Das osmotische Verhalten keimender Weizenkörner. **(The osmotic behaviour of germinating wheat kernels).**
Züchter 1952 : **22** : 65–79.

No relation was found between the osmotic pressure in germinating wheat kernels and the degree of frost resistance or the overwintering percentages in the varieties tested. The same absence of correlation was also noted in regard to drought resistance.
Varieties with short dormancy without exception showed high osmotic pressures, while varieties with long dormancy showed low values.

2601 Schrimpf, K.
Beobachtungen über den Entwicklungsrhythmus der Weizenformen; dargestellt am Hohenheimer Weizensortiment. **(Observations on the developmental rhythm of wheat forms; carried out on the Hohenheim wheat collection).**
Z. Acker- u. Pflanzenbau 1952 : **94** : 480–529.

A collection of over 800 wheat forms of the most varied provenance, containing both spring and winter wheats, was examined in the years 1947, 1948 and 1949. Observations were made on date of ear emergence, flowering and ripening. The results show that the total sum of heat received during a particular developmental phase is the decisive factor in the development of a given variety. Certain extremely hardy varieties such as Minhardi become more susceptible, once their dormancy has been broken, than some less hardy and less pronouncedly winter types, which have a greater capacity for hardening during development. These latter are the more suitable types to breed for localities subject to late spring frosts. The German wheats, according to their developmental rhythm, do not all fit into the proles *hydrophilum* Flaksberger and two more proles, *bavaricum* and *orientale-germanicum*, are required to accommodate them (cf. Abst. 1066). These are compared in respect of their developmental characters with the wheats of Sweden, Russia, Poland, Finland, the countries of south-eastern Europe, Italy, Portugal and North and South America, all of which are ascribed to their respective proles.

2602 Nedeševa, G. N.
(Changes in the inheritance of winter wheats caused by temperatures below zero during the vernalization phase).
Agrobiologija (Agrobiology) 1952 : No. 2: 55–66. [Russian].

At the Institute of Genetics of the USSR Academy of Sciences the hereditary properties of Lutescens 329, Hostianum 237 and Durable were changed by keeping their seed at varied temperatures below zero before the vernalization phase. In some cases the effect of the treatment was intensified by repeating the experiment with the seed of the succeeding generation.
The changes involved the compactness of the ear, awning, colour of the ear and grain, and the morphology of the glumes.

2603 Ter-Avanesjan, D. V.
(The effect of fertilization conditions upon variability of plants).
Doklady Akad. Nauk SSSR. (Rep. USSR Acad. Sci.) 1950 : **74** : 619–22. [Russian].

At the USSR Institute of Plant Industry pollination of wheat, cotton and linseed with very small amounts of pollen, for instance, wheat with 1–2 and cotton with 10–20 pollen grains, shattered their inheritance and caused extensive segregations in their progenies.
Some promising early and productive material has been obtained by this method from the

linseed Krasnokutskiĭ 420 [Krasnyĭ Kut 420] and the cotton 8517.
Other Mičurinite techniques used to break down the conservative inheritance of 8517 and other cotton varieties consisted of sowing the seed 20 days later than the normal sowing date and irrigating the plantations 3 instead of 7 times.

2604 Ovčinnikov, N. N.
(The effect of pollen from different portions of the ear upon crosses).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 76–77. [Russian].

At Kišenev State University the effect of pollination of wheat with the pollen from the central spikelets and that from spikelets at the proximal and distal ends of the ear upon grain setting, development of the grains and the weight and size of the grains was investigated. The method consisted of removing all but the three first florets in the three central spikelets of Od 13 [Odessa 13] and Melanopus 37. These florets were emasculated, isolated and pollinated with pollen from different portions of the ear of Albidum 43 and Candicans 76/10 respectively. The evidence suggests that the pollen from the first florets of the central portion of the ear was not only larger, but also more viable and set better quality seed.

2605 Kiričenko, F. G.
(Intervarietal hybridization of winter wheat).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 11 : 3–13. [Russian].

The productiveness and other economic characters of several wheats, including Odesskaja 3 [Odessa 3], Odesskaja 12 and Ukrainka [Ukrainian], were improved by open intervarietal pollination at the Institute of Breeding and Genetics, Odessa. The vigour and productiveness of the hybrids increased in the later generations as a result. The experiments have shown that local wheat standards make the best female varieties, while good locally developed wheats or introductions from other districts adapted to the local conditions make the best male parents.
Individual selection of the hybrid material has given some promising new wheats, including 921, derived from Ukrainka. It is hardy and shows resistance to lodging and its grain properties are as good as those of Ukrainka.

2606 Voĭtčišina, O. N.
(Directed training of winter wheats).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 71–73. [Russian].

Directed changes were obtained at the USSR Scientific Research Institute of Plant Protection with several promising wheat hybrids bred at the North Osetian State Breeding Station. The material acquired a higher degree of resistance to rust when injected with an aqueous solution of $Ca(NO_3)_2 + KH_2PO_4$ and then either sprayed with salt solution or dusted with sulphur. The changes were transmitted to the next generation.

2607 Timofeeva-Tjulina, M. T.
[The hardiness of evergrowing (perennial) wheat].
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 44–58. [Russian].

The difficulties of training perennial wheats 2 and 3 for hardiness are discussed; they prefer the foreign pollen of wheat or *Agropyron* to self pollen with the result that they lose the perennial habit or the desirable characters of wheat, respectively.

2608 Ključareva, M. V.
(Cytological investigations of some interspecific hybrids).
Agrobiologija (Agrobiology) 1952 : No. 1 : 44–51. [Russian].

At Gorki Leninskie, crosses between the wheat Ukrainka [Ukrainian] and a rye of the type sometimes found in fields of wheat have given an F_1 comprising sterile plants with 28 chromosomes and normal fertile plants of the female parental type with 42 chromosomes.
Crosses, involving rye as the female and wheat as the male parent, gave a very low percentage of grains. All F_1 hybrids were normal fertile rye plants with 14 chromosomes. The results of cytological analyses of several wheat hybrids are described. F_4 hybrids between the 28 chromosome Vetvistaja Kahetinskaja [Branching Kahetian] and a soft winter wheat with 42 chromosomes produced ears whose pollen grains had 21, 18, 17, and 14 chromosomes. Differences in chromosome number sometimes occurred in the same ear.
An abnormal wheat hybrid between Vetvistaja Kahetinskaja and a soft winter wheat was also investigated. This plant produced ears characteristic of *Triticum vulgare* var. *nigriaristatum*, *T. vulgare* var. *ferrugineum*, *T. vulgare* var. *suberythrospermum*, *T. turgidum* var. *compositum* subvar. *Plinianum* and *T. polonicum*

types. It was found that the F_4 grown from seed of the *T. vulgare* types had 42 chromosomes while the plants obtained from the other two species had 28 chromosomes.
Lastly, analyses were made of a soft winter wheat with 42 chromosomes. It was obtained by directed training of a hard wheat with 28 chromosomes. It was found that some cells of the roots of the same plant had 28 and others 42 chromosomes. The pollen grains from different ears produced by the same plants had 14 or 21 chromosomes.

2609 Serenkov, G. and Palkina, N.
(Changes in carbohydrates occurring in the shoots of grains grafted upon foreign endosperms).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 19–23. [Russian].

The results of chemical analyses of 15-day-old shoots of wheat grafted on wheat, barley on barley, barley on wheat and wheat on barley are reported. The shoots developing from the embryos of the wheat Garnet, grafted upon the endosperm of the barley Viner, contained a polysaccharide normally found only in barley shoots.

2610 Ryžeĭ, I.
(Branching winter wheat obtained from normal soft wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 3–7. [Russian].

Several promising branching winter wheats, including P–32 and P–247, have been obtained at the Kirgizian State Breeding Station by Mičurinite training of *Triticum vulgare* varieties. The method consisted of removing $\frac{4}{5}$ of each ear and training the plants upon good soil for several generations to develop and fix the branching habit. This method was chosen because of the difficulty of eliminating the undesirable characters which branched *T. turgidum* transmits to its progenies when crossed with *T. vulgare.*

2611 Kornilov, A. A.
(Breeding large and highly productive ears).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 10–21. [Russian].

Several promising large-grained long-eared hybrids of wheat, GSK–24, GSK–25, B–50, B–55 and B–57, were bred at the Karaganda Agricultural Research Station from Akbidaĭ 630 x Melanopus 69. Directed changes in their ear characters were obtained by varied photoperiods.

2612 Geerdes, J. D. and Harris, R. H.
Characterization of hard red spring and durum wheat proteins by some physicochemical properties.
Cereal Chem. 1952 : **29** : 132–41.

Hydration, sedimentation and viscosity measurements of five varieties of hard red spring wheat and five durum wheat varieties were characteristic of the two types of wheat; these differences are correlated with suitability for the manufacture of either bread or macaroni.

2613 **(For a further improvement of breeding and seed growing work).**
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 3–10. [Russian].

Breeding work with cereals, forage and oil plants in the USSR, with the greatest emphasis on breeding wheats, is discussed. In 1951, alone, 1120 cultivated and local varieties of these crops were made standards. Several varieties of wheat, maize and sunflower, which have been developed in recent years, are listed. Some research institutes are commended for the application of Mičurinite methods to breeding and seed growing, while others are criticized for the absence of results, attributed to neglect of the new techniques.
The aims of the wheat breeder are defined. In the Ukraine winter wheats showing resistance to lodging and frit fly are needed; in the northern Caucasus, wheats carrying resistance to rusts, bunt and smut; in the nonblack-earth zone, central black-earth provinces and some south-eastern districts, wheats that are hardy, early and not susceptible to smut; and in western Siberia and northern Kazahstan, productive early spring varieties adapted to local conditions and showing resistance to lodging, shedding and loose smut.
Breeding for good baking and milling properties is a task common to wheat breeders of all the above zones. It is stated that in this respect all wheats developed in recent years are inferior to Sarrubra. In this connexion reference is made to a soft spring wheat Albidum 1264, bred by Šehurdin, which has the baking and milling properties of the best hard wheats.

2614 Marušev, A. I.
(Varieties of soft spring wheats for making macaroni and groats).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 3–7. [Russian].

A soft wheat, Albidum 1264, with vitreous

grain of the hard wheat type has recently been obtained by hybridization and Mičurinite training at the Institute of Agriculture of the South-eastern USSR. It is more productive and makes better macaroni than Hordeiforme 432 and other hard wheats. Its baking and milling properties are as good as and in some respects even better than those of the hard wheats.

2615 MUKERJI, A. K.
Size and shape of plots in wheat trials.
Proc. Bihar Acad. Agric. Sci. 1952 : **1** : No. 1 : 19–24.

In a uniformity trial with the wheat NP 52 at the Bihar Agricultural College, the standard error per cent per plot was reduced with increased plot size up to $\frac{1}{40}$th of an acre. Long and narrow plots generally gave lower standard errors than square or nearly square ones of the same size. On the basis of 2% standard error the number of replications and areas required for different plots has been calculated.

2616 SUMANOV, E. JA.
(The origin of Milturum 321).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 73–74. [Russian].

Milturum 321 was derived from a single ear of a west Siberian local variety showing resistance to drought.

2617 ELLERTON, S.
Wheat breeding in England : a review of present-day possibilities.
J. Inst. Corn and Agric. Merchants 1952 : **3** : 100–04.

The effects of seasonal variations on the yields of genetically pure lines and on the original mixed land races from which present day varieties have been derived are discussed, with emphasis on the plasticity of mixtures which enables them to yield moderately well under a wide range of conditions. It is suggested that several pure lines, showing winter hardiness, desirable grain quality and resistance to disease, lodging and harvest losses caused by shedding or sprouting, should be mixed together and grown for a number of years, allowing natural selection to eliminate the less satisfactory components. Such a mixture would tend to become selected for high yielding ability and should be more stable in this respect than any pure line.

2618 BUKAREV, B. M., and NEVZOROV, V. V.
(The results of research in 1950 at the Tadžik State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 12 : 22–27.

Wheat. The new early and productive varieties Lutescens 16, Erythrospermum 262 and Erythrospermum 137, which show resistance to lodging and fungous diseases, are being tested. In trials at the institute they outyielded the standard Surhak 5688 by 2·1–3·9 c. per ha. They were bred from a local *erythrospermum* variety and an *albidum* wheat originating from South Africa. Trials of Surhak Jubileĭnyĭ [Jubilee Surhak], developed from Surhak 5688 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2533), are in progress.

Dactylis. A wild form suitable for rain-fed cultivation in mixed fields with lucerne has been selected. It is productive, yields good quality hay and shows resistance to shedding.

Linseed. A new promising variety, 89, has been obtained by selection and training of local material. It yields 13·4% to 20·6% more seed and 0·5–0·8 c. per ha. more oil than the standard Gissarskiĭ 474; it is taller than the standard and can be harvested mechanically. Selection of another promising large-seeded form originating from Azerbaĭdžan is in progress. It has a remarkably long stem, 14 cm. taller than the standard.

2619 SUBBOTINA, A. E.
(New promising varieties of spring wheat at the Kineljskaja State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11: 8–11. [Russian].

Wheats recently bred at the institute include the hard spring wheat Hordeiforme 1404 and the soft spring variety Lutescens 801, which have been made standards for the Kuĭbyšev province. Hordeiforme 1404, from Erythrospermum 841 x Hordeiforme 189, is as productive as the standard during drought and outyields it by 1 c. per ha. in normal seasons. It has vitreous grain of good quality with a 1000 grain weight higher than that of the standard. It shows resistance to lodging, drought and brown rust and reaches maturity 1–2 days after Hordeiforme 189.

Lutescens 801, selected from a local population of Noé, is more productive and shows a higher degree of resistance to drought, loose smut and lodging than Lutescens 62; its 1000 grain weight is 29·32–39·35 grm. It reaches maturity two days after the standard.

Other promising varieties, still under trial, include Lutescens 21, from Marquis x Lutescens 62, which shows resistance to lodging, loose smut and rust; Cinereum 546, from Sarroza x Caesium 111, showing resistance to drought and producing good quality vitreous grain; the

productive varieties Lutescens 896 and Lutescens 1395, obtained by free intervarietal pollination; and Lutescens 1403, from Lutescens 33 x Lutescens 53/12, which produces firm straw and vitreous grain.
Mičurinite breeding of new spring wheats for large or branching ears and improvement of existing varieties by open pollination, training upon good soil and selection are in progress. Several promising spring wheats have acquired a higher degree of resistance to loose smut when sown for one or several years in late autumn.

2620 Dšk.
Une nouvelle espèce de blé donne un rendement supérieur. (**A new variety of wheat produces a higher yield**).
Interagra, Prague 1951 : **5** : 321–22.
A productive variety of winter wheat, Barangan 77, has been developed at the Barangan Agricultural Research Station, Rumania. It produces good quality grain, is hardy and shows resistance to drought and diseases.

2621 Saltykovskiĭ, M. I. and Saprygina, E. S.
(**A theory of synthesis of physiological characters.**).
Doklady Akad. Nauk SSSR. (Rep. USSR Acad. Sci.) 1951 : **76** : 277–83. [Russian].
Crosses between two wheats showing similar degrees of hardiness but differing in respect of their periods of vernalization and light phase give many F_2 plants hardier than either parent. By applying this breeding principle to non-hardy varieties, some winter wheats as hardy as Hostianum 237 and Lutescens 329 have been developed. They include hybrids 169/69 from Milturum 321 x Kooperatorka [Cooperator], 117/64 from Lutescens 4952 x Kooperatorka, 167/3 from Milturum 321 x Erythrospermum 534 and 175/1 from Lutescens 3483 x Erythrospermum 534.

2622 (**A production conference at the Institute of Genetics**).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1951 : No. 6 : 128–29. [Russian].
The spring wheat Milturum 0321 acquired the winter habit, when sown in autumn upon stubble for several generations at the Čeljabinsk State Breeding Station and the Siberian Scientific Research Institute of Grain Farming. The new winter wheat proved as hardy as Lutescens 0329 under Moscow conditions.
Most plants of the winter type appeared in the later generations. Their proportion was greatest in material sown earliest in the preceding generation. All winter types, irrespective of the year in which they were obtained, were equally hardy. On the other hand, all plants of the spring wheat type remained as susceptible to cold as the controls. It is, therefore, concluded that the winter habit was acquired suddenly, without the development of intermediate semi-winter forms. The progenies of some single ears segregated in respect of habit, and also morphologically. The morphological changes affected such characters as awns, shape and colour of the ear, and the shape of the empty glume.

2623 Judanov, I. M.
(**Controlling the winter and spring habit in intervarietal hybrids of wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 24–31. [Russian].
Breeding wheats, involving Mičurinite training for the spring and winter habit, at the Miljutinskaja State Breeding Station is reported. The material comprised several late spring varieties showing resistance to fungous diseases. Several promising new spring and winter wheats are under trial. Some of them show resistance to smut, bunt and yellow rust.

2624 du Plessis, S. J. and Nortjé, J. H.
Susceptibility of wheat and rye varieties and of grass species to *Ophiobolus graminis* Sacc.
Sci. Bull. S. Afr. Dep. Agric. 1951 : No. 328 : Pp. 19.
In field and greenhouse trials of 47 wheat varieties organized by the Stellenbosch-Elsenburg College of Agriculture, South Africa, from 1946 to 1950, Sterling was the only variety to show some resistance to *O. graminis*. Sterling selections made in 1949 were, however, severely infected the following year. In view of the high degree of take-all resistance shown by ryes such as Abbruzzi, Cape Rye, Stooling Rye and Balbo, several hybrids between Chinese wheat and Abbruzzi rye were included in the trials; some F_1 selections proved more resistant than Sterling and showed power of recuperation after infection, but in later generations this resistance was apparently lost. A few hybrids between wheat and *Agropyron elongatum* were available for trial, but showed no resistance to *O. graminis*. All of the 15 grass species common in wheat fields proved susceptible to take-all, thus ensuring the survival of the pathogen from year to year.

2625 Afifi, A.
Production of rust resistant *vulgare* wheats by backcrossing. II.
Bull. Roy. Agric. Soc., Egypt 1952 : No. 36 : Pp. 34.

A detailed report is given of work carried out during the period November 1950 to June 1951, in continuation of the programme of breeding for rust resistance in *Triticum vulgare* by backcrossing (cf. *Plant Breeding Abstracts*, Vol. XXII, Abst. 1097). An F_3 family from the backcross (Mokhtar x Giza 139) x Giza 139 has shown a high degree of seedling and adult plant resistance to all races of stem rust so far discovered in Egypt (cf. Abst. 1813). Among the introductions tested as possible sources of rust resistance, a cytologically stable derivative of a cross between *T. Timopheevi* and *T. vulgare* shows particular promise. This derivative and other introductions have been crossed with the Egyptian varieties Tousson, Mokhtar and Giza and some experimental strains.

2626 Pal, B. P.
Wheat breeding investigations at the Indian Agricultural Research Institute.
J. Indian Bot. Soc. 1951 : **30** : 1–13.

A general review of research carried out at New Delhi since 1936 summarizes progress made in breeding for resistance to rust, loose smut and flag smut. Performance tests of some of the newly evolved NP strains are also reported from several regions.

During the course of genetical investigations concerning ear characters of interspecific and intergeneric hybrids, some plants closely resembling *Triticum sphaerococcum* appeared in the F_4 and F_5 of *T. vulgare* x *Aegilops caudata*; this discovery has suggested that *T. sphaerococcum* arose by similar intergeneric hybridization.

An analysis of the percentage of natural cross pollination under Delhi conditions was undertaken, using NP 4, NP 52 and NP 120, whose F_1 hybrids are easily detected; total percentage of natural crossing from 1944 to 1947 varied from nil to 0·44%, indicating that varietal purity should be maintained without difficulty.

The trend of changes in the proportions of 11 species in a mixed population under the influence of natural selection was studied from 1943 to 1949. During that period *T. durum*, *T. polonicum*, *T. dicoccum*, *T. dicoccoides*, *T. Timopheevi*, *T. monococcum* and *T. aegilopoides* were eliminated and *T. vulgare* became dominant; the latter showed a change from 7·1 to 94·4% of the total population.

2627 Mullin, J., Fox, D. and Brady, J. J.
Wheat midge.
Nature, Lond. 1952 : **169** : 629–30.

In Éire the wheat variety Atle has shown much more resistance to a severe midge attack in 1951 than Progress.

2628 Wall, A.
The diameter of the wheat stem in relation to the length and sex of emerging sawfly (*Cephus cinctus* Nort.).
Sci. Agric. 1952 : **32** : 272–77.

In a study of six wheat varieties grown in five replicates at three stations in Canada, the average length of the female sawflies differed according to the host variety. For five varieties, correlations between female length and diameter of the stub from which the insects emerged were significant. In no case however was the correlation coefficient large; less than 20% of the variability in length could be ascribed to stem size. The data revealed a significant preponderance of females from larger stems and of males from smaller stems. It is pointed out that smaller stems are usually later maturing and in general would be infested last. Possibly the supply of spermatozoa might not be sufficient to fertilize eggs deposited late. The problem of whether an association exists between maturity of a variety and sex ratio is under investigation.

2629 Kizima, P. N.
(The determination of milling and baking properties of the wheat grain).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 11–20. [Russian].

The effects of physical properties of the grain, including 1000 seed weight, shape, colour and vitreousness, upon the baking and milling properties of the more important Soviet varieties of wheat are discussed, with reference to the methods and results of analyses of the laboratory of the State Commission for Varietal Trials.

2630 Pendleton, J. W., Dungan, G. H., Bonnett, O. T. and Bever, W. M.
Winter wheat variety trials 1940-1950.
Bull. Univ. Ill. Agric. Exp. Sta. 1952 : No. 549 : 319–43.

The results of extensive trials of hard and soft winter wheat varieties in Illinois are surveyed. Varieties which gave a superior performance in the trials and which became widely grown in the

period under review comprise Pawnee, Fairfield, Blackhawk, Vigo and Royal. In recent tests the soft wheats Saline, Seneca and Butler and the hard wheats Westar, Minter and Triumph have shown promise. Saline (Gladden x Illinois 2), developed at the Illinois Agricultural Experiment Station, appears to be well-adapted to central and southern Illinois on soils of all levels of fertility. It is stiff-strawed, bearded and white-chaffed, and above the average in test weight and milling and baking characteristics. Seed distribution of Saline is planned for 1952.

BUCKWHEAT

2631 Koroleva, N. Ju.
(The hybridization of buckwheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 38–42. [Russian].

The biology of flowering and the methods of breeding buckwheat were investigated at the Gorjkiĭ Agricultural Institute. It was found that self pollination does not occur under field conditions in the central belt of the USSR. A cross pollination technique, involving the removal of the lateral branches and open and wilted flowers, isolation without emasculation, and reciprocal pollination between long-styled and short styled flowers, is advocated.

2632 Pisarev, V. E. and Vinogradova, N. M.
(New ways of breeding buckwheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 35–38. [Russian].

Breeding buckwheat at the Institute of Grain Farming of the Nonblack-earth Belt is discussed. A promising population, Dvadcatka [Twenty], outyielding the standard by 4 c. per ha., is now under trial. It was obtained by continued open pollination between twenty productive local and cultivated varieties and subsequent selection of the most productive plants for many large, mature and well-developed grains. Similar methods were used to develop productive populations of tetraploid buckwheat. Population 1 was built up from 229 seeds of tetraploid élites of the varieties Bogatyrj [Hero], Boljševik [Bolshevik], Kamyšinskaja [Kamyšino], Buturlinskaja, Kolhoza Imeni Krupskoĭ [Krupskaja Kolhoz], Aleksandrovskaja 605, Aleksandrovskaja 612, Jaroslavskaja [Jaroslavlj], Burjatmongoljskaja [Burjat-Mongolian] and Krasnoufimskaja S–216 [Krasnoufimsk S–216]. This population yielded 7·4 c. more per ha. than Voznesenskaja and had a 14·07 grm. higher 1000 grain weight. However, the tetraploid population produced 3·85% more husk than Voznesenskaja. Population 2 was developed from the 18 most productive families of all the above varieties except Kamyšinskaja. It yielded 1·9 c. more per ha. than Population 1 and had a lower percentage husk. Both tetraploid populations showed resistance to lodging and grey rot and contained 1·43% more protein than diploid buckwheats. Promising breeding material was obtained by vegetative hybridization involving a Japanese variety originating from South Sahalin, and the diploid varieties Bogatyrj and Voznesenskaja as scions, and *Polygonum tataricum* as stock.

2633 Jacques-Félix, H.
De la présence d'un *Fagopyrum* sur les montagnes de l'Ouest africain. **(On the presence of a *Fagopyrum* on the mountains of West Africa).**
CR Acad. Sci. Paris 1947 : **224** : 412–13.

A new species, *F. ciliatum*, has been discovered on mountains in the Cameroon. It is thought to be a prequaternary migrant from the centre of origin of the genus in Asia.

OATS

2634 Stanton, T. R.
Registration of varieties and strains of oats, XVI.
Agron. J. 1952 : **44** : 144–53.

Detailed descriptions are given of the following varieties recently approved for registration in the USA: Letoria, Wintok, Cherokee, Shelby, Zephyr, Atlantic, Arlington, Andrew, Nemaha, Overland, Mustang and Cody (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 154; Vol. XIX, Absts. 265 and 945; Vol. XX, Absts. 32, 246, 676 and 1582; and Vol. XXI, Absts. 306, 1791 and 2591).

2635 Vinogradova, E. I.
(The improvement of a variety by training and selection).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 56–61. [Russian].

Continuous selection and Mičurinite seed growing methods at the Leningrad State Breeding Station have given an improved strain of the oat Zolotoĭ Doždj [Golden Rain].

2636 KORNILOV, A. A.
(The early maturing oat Dolinskiĭ GK-16).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 31–34. [Russian].

Dolinskiĭ GK–16 was bred at the Karaganda Agricultural Research Station from Srednemorskiĭ 4636 [Mediterranean 4636], a hybrid originating from Anatolia with a medium long light phase, and Lohovskiĭ [Lochow], which is remarkable for its short vernalization and light phases. The new variety is early and shows resistance to drought. It is more productive and has a higher 1000 grain weight than the standard Lochow.

2637 EARHART, R. W. and SHANDS, H. L.
Oat varietal responses to infection by *Helminthosporium avenae* Eid.
Agron. J. 1952 : **44** : 234–38.

A report is given of the results of tests carried out in Wisconsin to determine the reaction of a large number of varieties to the seedling blight and leaf spot stages of *H. Avenae* infection under greenhouse conditions, and to foliage infection in the field. Most of the varieties were relatively resistant to seedling infection. In both greenhouse and field, reactions to foliage infection varied widely. The average infection indices for seedling and foliage inoculations in the greenhouse, using the data for 52 varieties, were 2·61 and 4·81, respectively. A correlation coefficient of + 0·90 was obtained between the results of foliage tests in the greenhouse and field. Only a few varieties, e.g. B1–47–67 and Wisconsin hybrid X 279–1, showed sufficient resistance to both seedling and foliage infection to warrant their use in breeding.

RYE

2638 SCHIEMANN, E. and NÜRNBERG-KRÜGER, U.
Neue Untersuchungen an *Secale africanum* Stapf. II. *Secale africanum* und seine Bastarde mit *Secale montanum* und *Secale cereale*. Vorläufige Mitteilung.
(New investigations on *S. africanum* Stapf. II. *S. africanum* and its hybrids with *S. montanum* and *S. cereale*. Preliminary communication).
Naturwissenschaften 1952 : **39** : 136–37.

With the aim of clarifying the systematic and phylogenetic status of *S. africanum*, crosses were made between *S. africanum*, *S. montanum* and varieties of *S. cereale*; the cross *S. cereale* x *S. africanum* was only successful with *S. cereale* as the ♀ parent. The set of seed and fertility in the parent species and in the crosses were investigated. The F_1 seeds from *S. montanum* x *S. africanum* and the reciprocal, *S. montanum* x *S. cereale* and the reciprocal, and *S. cereale* x *S. africanum* were sown, and the cytological behaviour of the hybrids and of the parent species was studied.
It was found that *S. cereale* differs from the two wild species in that it has two reciprocal translocations. Study of the fertility and the course of meiosis showed that *S. montanum* and *S. africanum* are more closely related to each other than to *S. cereale*. Hence, the view that *S. cereale* is derived from *S. montanum* is refuted.

2639 LIMA-DE-FARIA, A.
The chromomere size gradient of the chromosomes of rye.
Hereditas, Lund 1952 : **38** : 246–48. (Abst.)

Chromomere analysis, carried out at the Institute of Genetics, Lund, on *Secale cereale* has shown that every chromosome has the same general arrangement of chromomeres, consisting of a size gradient on either side of the kinetochore. Next to the latter the chromomeres are large, and a decrease in size occurs either to the end of the arm or as far as the intercalary knob when this is present; beyond the intercalary knob the chromomeres are of irregular size. This chromomere size gradient is independent of the genetic constitution of each particular chromosome and occurs in other plants, such as *Agapanthus umbellatus*. It is most easily interpreted by assuming that a substance streams from the kinetochore along the chromosome in both directions, controlling the heteropycnotic appearance of the different chromosomal regions. Heteropycnosis is therefore not only determined by the genetic constitution and nuclear environment of a part of the chromosome, but also by the position of this region within the chromosome.

2640 GELIN, O. E. V.
Tetraråg. Kromosomfördubblad Petkusråg. **(Tetra rye. Petkus rye with doubled chromosome number).**
Weibulls Årsb. 1951 : 7–8.

This new rye bred by W. Laube is undergoing tests at Weibullsholm and other places in Sweden to determine its desirable and undesirable features and its requirements for successful

cultivation in large scale trials. Special attention is being given to strength of straw, resistance to the fungous diseases prevalent in winter, and the elimination of cross-pollination, which leads to wrinkling of the grain and loss in total yield.

2641 *Nuždin, N. I.
(In Sweden).
Vestnik Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1951 : No. 12 : 100–05. [Russian].

Swedish plant breeding methods are criticized from the Mičurinite viewpoint. Polyploids, including the tetraploid rye raised by Müntzing at Svalöf, which has a 1000 grain weight double that of diploid rye but produces many empty seeds and has a low tillering capacity, are regarded as of little practical value.

2642 Hmelev, B. I.
(Using mixed seed for intervarietal pollination of winter rye).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 68–69. [Russian].

At the Verhnjačka Breeding Station the effects of intervarietal open pollination upon economic properties of the rye standards Taraščanskaja 2 and Taraščanskaja 4 were investigated. The method consisted of sowing the following seed mixtures: Taraščanskaja 4 + Petkus Veselopodoljanskiĭ [Veselyĭ Podol Petkus], Taraščanskaja 2 + Petkus 194 Harjkovskiĭ [Harjkov Petkus 194], Taraščanskaja 2 + Petkus Lohovskiĭ [Lochow Petkus] and Taraščanskaja 2 + Veselopodoljanskiĭ.

Taraščanskaja 4 had a higher 1000 grain weight as a result of open pollination with Petkus Veselopodoljanskiĭ, but its yield of grain and straw decreased.

Taraščanskaja 2 + Petkus 194 Harjkovskiĭ yielded 4·23 c. more grain and 2·46 c. more straw per ha. than the élite of Taraščanskaja 2. Taraščanskaja 2 + Petkus Veselopodoljanskiĭ and Taraščanskaja 2 + Petkus Lohovskiĭ also showed increases in grain yield, but the straw yields were lower than that of the élite. The 1000 grain weight of the élite Taraščanskaja 2 was higher than that of Taraščanskaja 2 + Petkus 194 Harjkovskiĭ, lower than that of Taraščanskaja 2 + Petkus Veselopodoljanskiĭ and the same as that of Taraščanskaja 2 + Petkus Lohovskiĭ. The hybrid material was hardier and less susceptible to rust than Taraščanskaja 2.

2643 Medvedev, P. F.
(The productiveness of winter rye varieties obtained by intervarietal open pollination).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 12 : 9–13. [Russian].

The yielding capacity of several varieties of winter rye was improved at the Leningrad State Breeding Station. The hybrids produced more viable seed with a higher 1000 grain weight and were hardier, and more productive and vigorous and had a better tillering capacity than the initial varieties. Their yields increased again when they were open-pollinated in the following year.

Mass selection of the hybrid material has given the promising new varieties Leningradskaja Gosudarstvennaja Selekcionnaja Stancija [Leningrad State Breeding Station] 2, 3, 4 and 5, which outyield the standard Vjatka by 4·1 to 7 c. per ha.

2644 Bogomjagkov, S.
(A new variety of winter rye).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 46–47. [Russian].

Sibnizhoz 1 was selected from a population involving Omka [Omsk], Vjatka, Lisicyna [Lisicyn's], Petkus 194 and RDS at the institute† after which it has been named. The material was grown upon stubble and selected for large seed.

The new variety outyielded the hardy Omka by 4 c. per ha. and proved 5·9% hardier than it. Its 1000 grain weight was 7·5 grm. higher and its quality superior to that of Omka.

2645 Sazanov, V. I.
(An experiment in developing a variety of winter rye for the Kuĭbyšev province).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1952 : No. 5 : 3–8. [Russian].

At the Kuĭbyšev Agricultural Institute open pollination of a local rye with Petkus 194, originating at the Harjkov Research Station, and continuous selection has given a new

* An extended summary of this paper is on file at the Bureau.
† Sibirskiĭ Naučno-Issledovateljskiĭ Institut Zernovogo Hozjaĭstva [Siberian Scientific Research Institute of Grain Farming].

variety Kuĭbyševskiĭ SHI*. It is hardy, shows resistance to drought, produces few empty seeds, and has a medium long ear, firm short straw and yellow-green grain with a higher 1000 grain weight than Volžanka [Volga] and the standard Saratovskiĭ 1 [Saratov 1], yielding 1·5 to 4·9 c. more grain per ha. than the above varieties.
Selection of the local variety for large grain and firm straw and training of Petkus 194 for hardiness proved less satisfactory breeding methods than open pollination and selection.

MAIZE

2646 Pendleton, J. W. *et al.*
Illinois tests of corn hybrids in wide use in 1951.
Bull. Ill. Agric. Exp. Sta. 1952 : No. 552 : 407–47.
The results of trials of 328 maize hybrids at several centres in Illinois are summarized.

2647 Riedl, W. A., Rincker, C. M. and Quayle, W. L.
Hybrid corn adaptation trials in Wyoming for 1947-1950.
Bull. Wyo. Agric. Exp. Sta. 1951 : No. 306 : Pp. 16.
Trials conducted at 4 centres in Wyoming during 1950 to determine the adaptability of 70 hybrids are summarized, with results obtained from similar trials during the past 4 years.

2648 Boceta Durán, V.
Sobre trabajos selectivos en maices. **(Selection work in maize).**
Genet. Iber. 1950 : **2** : 331–37.
The method of crossing consanguineous lines (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 277) for the provisional improvement of maize varieties until inbred lines are available, and the method of pollination adopted, are again described, illustrating the contribution that the method may make towards the important problem of conserving locally adapted germplasm.

2649 Távora, L. de
O melhoramento de milho em Angola. **(Maize breeding in Angola).**
Agron. Angol. 1951 : No. 5 : 111–26.
An outline is given of the methods of breeding maize; ear-to-row selection applied to the local maize populations in Angola has led to the production of a good maize adapted to the conditions of the Benguela plateau and resistant to *Helminthosporium turcicum*. The number of grains per ear has been raised from 130–275 to 306–640 in the variety Branco Redondo [Round White].
Work is now in progress on the production of inbred lines. Tests of top crosses of the inbred lines with the variety Dente de Cavalo do Cavaco [Cavaco Dent] showed significant differences between them in yield and other characters. The best 37 lines have been selected for the production of single and double crosses.

2650 **Wisconsin hybrids released.**
Crops and Soils 1952 : **4** : No. 8 : p. 30.
Wis. 525A and Wis. 575, two new maize hybrids developed at the University of Wisconsin, have been released for seed production. Wis. 525A matures in 105 days and yields 5–10 more bushels per acre than Wis. 525; Wis. 575 matures in 110 days and outyields Wis. 595 by about 5 bushels per acre. The grain of both hybrids husks easily and is of good quality.

2651 Homenko, A. A.
(Maize hybrids in the Kulundinskaja Steppe).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 77–78. [Russian].
Breeding work at the Slavgorod State Breeding Station with maize, involving intervarietal open pollination between cultivated and local flints, which do better under the conditions of the arid steppe, is reported. The most promising hybrids were obtained from direct and reciprocal crosses between Mestnaja Belaja [Local White] and Pervenec [First-born], the last named being an early Siberian variety, and between Slavgorodskaja 270 [Slavgorod 270] and Mestnaja Belaja. Reference is made to a promising new variety Slavgorodskaja 1.

2652 Rhoades, M. M.
The effect of the bronze locus on anthocyanin formation in maize.
Amer. Nat. 1952 : **86** : 105–08.
The gene *br* (bronze) is situated in the short arm of chromosome 9. The linear order of the genes in this arm is as follows: *Dt-yg*$_2$*-C-sh-bz-bp-wx*-centromere. Data on different genotypes indicate that the gene pair B_2b_2 does not determine the actual production of plant and aleurone pigments, but that it has an important influence on the kind of pigments produced and in some cases on their distribution within the cell.

* Seljskohozjaĭstvennyĭ Institut [Agricultural Institute].

2653 Rudorf, W. and Schnell, W.
Die Leistungen amerikanischer Hybridmaise in westdeutschen Versuchen 1949–51. (**The performances of American hybrid maize varieties in experiments in West Germany in 1949-51**).
Mitt. dtsch. LandwGes. 1952 : **67** : 435–37.

The experiments formed part of the FAO programme (cf. Abst. 1856). The hybrids exceeded the German varieties of the same maturity group by an average of 25% in yield; this applied even to the relatively early maturing dent maizes such as Wis. 255. The hybrids had also greater standing capacity and a lower cob percentage. In yield of green matter the superiority of the hybrids was less marked but in every maturity group there were some which outyielded the German varieties in this respect too, and in total yield the hybrids were unquestionably superior; some are specially recommended also for silage purposes, others for use as green fodder.
The importance of a correct choice of varieties in using hybrid maize in Germany is emphasized; a start has been made in breeding hybrids from local material.

2654 Resultados de las experiencias desarrolladas en España con híbridos de maíz durante el año 1949 y 1950. (**Results of the experiments carried out in Spain with maize hybrids in the years 1949 and 1950**).
Inst. Nac. Prod. Semillas Selectas, Madrid 1949 : Pp. 102; 1950 : Pp. 143.

Tests were made with a number of maize hybrids from the USA, obtained from FAO (cf. Abst. 1856) and elsewhere and including hybrids both of open and closed pedigree, together with certain Spanish varieties and hybrids. Full details are given of the conditions under which the tests were carried out at centres in different parts of Spain and Spanish Morocco. The results of the first year showed that the vegetative cycle of the American hybrids was longer in the north of Spain than in the place of origin, but shorter in the south. The highest yields were given by double hybrids in almost every centre and by a choice of hybrids with the most suitable maturity rating it should be possible to raise the average yield by 30–40%. The American hybrids in addition to being more vigorous were also more resistant to drought, lodging and smut (*Ustilago Zeae*) but less resistant to insect attack, and some of them, owing to incomplete enclosure of the ear, to bird damage.
In the second year the tests were more extensive and included a larger number of hybrids, and confirmed the results of the previous year.

2655 Costa-Rodrigues, L.
El maíz híbrido para la península Ibérica. (**Hybrid maize for the Iberian peninsula**).
Genet. Iber. 1950 : **2** : 339–41.

Reference is made to the cooperative maize breeding scheme organized by FAO (cf. Abst. 1856) and a plea is presented for the closer cooperation of Portugal and Spain, which have climatic conditions that would enable them to become exporters of hybrid seed to the rest of Europe.

2656 Milhos híbridos. (**Hybrid maize**).
Estud. Inform. Téc. Direcç. Geral Serv. Agríc. 1952 : No. 37 : Pp. 32.

The maize hybrids supplied under the FAO scheme (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2543) together with certain commercial hybrids and three Portuguese hybrids were tested in 1951 in all the maize-growing areas of Portugal and in certain zones to which the crop may possibly be extended. The tabular results presented show that the hybrids exceeded the local varieties in yield by amounts varying from 20·5 to 132%.

2657 Nežincev, I. P.
(**A conference on the seed growing of interline hybrids of maize**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 72–73. [Russian].

The organization of seed production of hybrid maize was discussed at a conference held at the Kubanj Research Station of the USSR Institute of Plant Industry in September 1951. The report by Kožuhov contained references to trials of VIR*25, VIR33, VIR37, VIR42, VIR49, VIR54, VIR63 and VIR160, the most promising double crosses developed recently at the institute. These outyielded the standards and intervarietal hybrids by 7–18 c. per ha., and showed a higher degree of resistance to lodging, blister smut and *Fusarium*.
VIR25 and VIR33 are the most productive early double crosses, and VIR42, VIR37, VIR49 and VIR54 the best mid-season maizes. VIR63 and VIR160 are the best of the late maturing double crosses.

* Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

A scheme of hybrid maize production involving raising the first generation of single inbreds at the breeding institutes, raising the second generation of single line inbreds at the district seed farms and the F_1 of double crosses on the state and collective farms, was approved.

2658 Schaal, W.
Five new corn hybrids available to growers in North Carolina.
Crops and Soils 1952 : **4** : No. **7** : p. 28.
Three yellow maize hybrids, NC 36, NC 24 and Dixie 82, and two white hybrids NC 29 and NC 31, are briefly described. NC 36 gives particularly good yields in the lower mountainous regions of North Carolina and so far has not been seriously affected by any disease. NC 24 is adapted to the upper mountainous districts where short season maize is required. Dixie 82 is recommended for both the Coastal Plain and Piedmont area; it outyields NC 27 and Dixie 18. NC 29 is adapted to the same regions as Dixie 82; it equals NC 27 in grain quality and weevil resistance. NC 31 has yielded well under dry conditions; it is resistant to leaf spot.

2659 Landrum, B.
Texas newest corn hybrid, Texas 30.
Seed World 1952 : **70** : No. **6** : 44–45.
A more detailed description of the new hybrid than that summarized in Abst. 1135 mentioned that Texas 30 was developed by combining inbred lines of Yellow Dent and Yellow Surecropper.

2660 Rossman, E. C., Down, E. E. and Decker, R. E.
Michigan 350 and Michigan 250—two new corn hybrids for Michigan.
Quart. Bull. Mich. Agric. Exp. Sta. 1952 : **34** : 201–09.
In the majority of trials of yellow hybrids Michigan 350 [(W 23 x MS 24) x (W 10 x MS 206)] and Michigan 250 [(Oh. 51 x R 53) x (W 10 x MS 206)] have excelled other maize hybrids in yielding capacity and resistance to lodging. Both hybrids belong to the 90-day maturity group. The inbreds MS 206 and MS 24 have not been previously used in hybrid production. Their origin is [(Golden Glow x Amargo) S_5 x Duncan] S_2 x Duncan and [(Golden Glow x Amargo) S_5 x Duncan] S_2 x Golden Glow, respectively.

2661 **Kansas approves new corn hybrid.**
Seed World 1952 : **70** : No. **7** : p. 40.
The yellow double cross hybrid maize K 1830, which has consistently outyielded K 1585 for six years at the Kansas Agricultural Experiment Station, has been approved for certification; it is recommended for southeastern and south central Kansas.

2662 Eckhardt, R. C.
Predicting yields of missing single crosses of corn.
Agron. J. 1952 : **44** : 215–16.
A method for estimating the yield of a single cross by minimizing the specific combining abilities of two maize inbreds is outlined, using a formula devised by Sprague and Tatum (cf. Abst. 501). Its accuracy is illustrated by assuming that data on the single cross Mp. 309 x Mp. 311 are missing from the results of an analysis of the specific combining abilities of seven inbreds. By calculating the yield of Mp. 309 x Mp. 311, the specific combining ability of these lines is indicated and thus the relative general combining ability of all seven lines can be determined. Results based on estimated yield are compared with those on actual yield.

2663 Sprague, G. F. and Miller, P. A.
The influence of visual selection during inbreeding on combining ability in corn.
Agron. J. 1952 : **44** : 258–62.
At the Iowa Agricultural Experiment Station two experiments were carried out in which six inbred lines were crossed in all possible combinations in each generation of inbreeding from the S_1 to S_5. In the first experiment the inbreds were all isolated from a 16-line composite, Stiff Stalk Synthetic; in the second each line originated from a different parental source. Statistical analysis of the data on yields of the crosses involving each inbred generation showed that visual selection had no influence upon general combining ability. In the first experiments selection for resistance to stalk breakage proved effective.

2664 Brooks, J. S. and Pass, H.
Oklahoma corn performance tests.
Misc. Publ. Okla. Agric. Exp. Sta. 1952 : No. MP–26 : Pp. 31.
On the bases of trials carried out between 1948 and 1951, maize hybrids are recommended for different parts of the state.

2665 Rundfeldt, H.
Die Ausnutzung des Heterosiseffektes in der Maiszüchtung. (**The utilization of the heterosis effect in maize breeding**).
Z. Pflanzenz. 1952 : **31** : 226–60.
This review, to which a bibliography of 123 references is appended, is a critical survey of

existing knowledge relating to heterosis, with special reference to its application in breeding.

2666 **New dent corn inbred released.**
Crops and Soils 1952 : **4** : No. 7 : p. 30.
The release of CI 21E, a yellow dent maize inbred used in the production of hybrid Missouri 804, is briefly referred to. It is an improvement over the inbred Hy as regards vigour, stalk characteristics and seed quality.

2667 Kinman, K. L.
Composite-sibbing versus selfing in development of corn inbred lines.
Agron. J. 1952 : **44** : 209–14.
Composite-sibbed lines have been developed in the maize breeding nursery at Renner, Tex., from selected S_1 progenies of 19 open-pollinated strains. Each S_1 progeny was grown in two adjacent rows; plants in one row were self-pollinated, and then their pollen was bulked and used to fertilize desirable plants in the adjacent row, thus producing lines designated $C_\#$ to distinguish them from lines maintained by selfing. A comparison of variability in respect of agronomic characters was made between seven lines in the S_4 generation and their related $C_{\#3}$ lines established by one generation of selfing followed by three generations of selective mass-sibbing. The $C_\#$ lines were consistently superior in respect of grain yield and quality, earliness, plant height and lodging resistance. Although $C_\#$ lines are more variable than homozygous progenies, all $C_\#$ lines examined at Renner retained the general appearance and characteristics of their S_1 parents.
It is therefore suggested that the $C_\#$ lines should replace inbreds in maize hybridization programmes where inbred lines are not easily maintained. Hybrids would be produced more rapidly by using $C_\#$ lines rather than inbreds, which are generally selfed for several generations before single crosses are attempted.

2668 Mazoti, L. B.
Irreversibilidad relativa de la variación citoplásmica heredable inducida por el gene *ij* (variegado) del maíz. [**Relative irreversibility of the hereditary cytoplasmic variation induced by the gene *ij* (variegated) of maize**].
Rev. Argent. Agron. 1952 : **19** : 35–38.
In continuation of earlier work (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2621), two further crosses of a line containing the *ij* gene are described, one with a plant of the constitution *AACCrrgg*, in which the expected 3% of albinos appeared in the progeny, the other with a plant of the constitution *AABBPlPlCCRRPr Pr*, in which no albinos appeared. It is thought that gene *R* may be responsible for the reversion of the modified cytoplasm to normal.

2669 Chase, S. S.
Production of homozygous diploids of maize from monoploids.
Agron. J. 1952 : **44** : 263–67.
Recently approximately 100 homozygous diploid lines have been developed from monoploids at the Iowa State College. An account is given of the techniques used, with reference to the following: isolation of monoploids in hybrid progenies with the aid of seedling and endosperm marker genes; differences between stocks as regards the frequencies with which they produce monoploids; handling and germination of seed likely to contain monoploids; technique of making chromosome counts in putative monoploids; culture of monoploids; natural doubling of the chromosome number and the production of diploids by self pollination involving the diploid sectors of monoploids; doubling of the chromosome number by colchicine; and culture of the diploid progenies. Ways in which monoploids may be valuable in breeding are discussed. At present the work is chiefly concerned with their possible value in (1) élite synthetics for use in recurrent selection and (2) the production of lines to replace inbreds in the development of hybrids.

2670 Hall, H. H., Curtis, J. J. and Shekleton, M. C.
The B-complex vitamin composition of corncobs.
Cereal Chem. 1952 : **29** : 156–60.
Varietal differences were noted in the vitamin content of maize cobs from 25 varieties grown in the US. Although the vitamin content of many varieties compares favourably with grain fodder such as wheat, sorghum and barley, maize cobs are more difficult for cattle to digest.

2671 Pittenger, T. H. and Frolik, E. F.
Temporary mounts for pollen abortion determinations.
Stain Tech. 1951 : **26** : 181–84.
Two methods of preparing temporary slides of maize pollen are described. In both the pollen is prestained, while still in the anther, in a concentrated solution of I_2 in KI. In one method a hot 1% aqueous agar suspension is used as the mounting medium; in the other colourless Karo, either pure or slightly diluted with water, is employed.

2672 Norden, A. J., Rossman, E. C. and Benne, E. J.
Some factors that affect protein content of corn.
Quart. Bull. Mich. Agric. Exp. Sta. 1952 : **34** : 210–31.

An analysis was made of the effects of locality, season, stage of maturity and genotype on the protein content of eight double cross hybrids of maize grown in experiments in Michigan. Differences in protein content among the hybrids were largely due to genetic factors, and were not greatly affected by environment or stage of maturity. In breeding for high protein content, inbred lines undergoing selection for this character should, it is suggested, be grown on soils high in nitrogen so that the genes for high protein content can be fully expressed.

2673 Blaringhem, L.
Récolte d'un maïs à gruau assurée au nord de la Loire. (**Harvest of a corn-flour maize satisfactory north of the Loire**).
CR Acad. Sci. Paris 1947 : **225** : 366–68.

The history is described of a maize variety reared by the author from the combination *Zea Mays* var. *semi-praecox* x Acajou. It is recommended for human consumption.

2674 Schneider, E. O., Earley, E. B. and DeTurk, E. E.
Nitrogen fractions of the component parts of the corn kernel as affected by selection and soil nitrogen.
Agron. J. 1952 : **44** : 161–69.

Analyses of the percentage of nitrogen in the embryo and endosperm of maize grains of Illinois High Protein, Illinois Low Protein, Illinois High Oil, Illinois Low Oil and Funk's G–80 have been carried out at Illinois University. Data show that selection for high percentages of protein and oil results in an increase in the proportion of embryo and a decrease in the proportion of endosperm; conversely, selection for low protein and oil content is accompanied by a relative increase in the size of the endosperm while the embryo becomes smaller. In each variety the embryo contains more nitrogen than the endosperm. Selection for high protein or low protein content was, however, found to produce changes in the nitrogen content of the endosperm rather than the embryo. Although all components of the total nitrogen content of the grain increased during selection for high protein content, alcohol soluble zein increased at the fastest rate; since zein has a low nutritional value the nutritive quality of varieties containing a high percentage of protein is less than that of varieties with low protein content.

2675 Hunt, C. H., Rodriguez, L. D., Taylor, S. and Bethke, R. M.
The effect of maturity on the variation in protein, niacin, and pantothenic acid content of corn hybrids.
Cereal Chem. 1952 : **29** : 142–47.

Similar rates of decrease in respect of niacin, pantothenic acid and protein content occurred in all six open-pollinated maize hybrids with advancing maturity, in trials at Wooster, Ohio. There is some indication that genetic factors regulating the niacin content also determine the protein content; hybrids with a high percentage of niacin generally have a low protein content.

2676 Rossman, E. C., Down, E. E. and Decker, R. E.
The Michigan Agricultural Experiment Station announces two new corn hybrids.
Seed World 1952 : **70** : No. 7 : 8, 54–55.

The new early maturing maize hybrids Mich. 350 and Mich. 250 produce high yields of medium sized ears with deep yellow grain borne on small cobs; the small cobs and open husks facilitate drying in the field. Both hybrids germinate quickly in cold wet soils and make rapid seedling growth.

2677 Pavlov, B. Ja.
(**The breeding of intervarietal hybrids of maize**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 3–12. [Russian].

In 1940, a study was made of heterosis in many maize hybrids bred at the Moldavian Agricultural Research Station. The most productive hybrid, Brown County x Longfellow, yielded 91·45 c. per ha. It showed intermediate resistance to blister smut.

2678 Kelman, A. and Hebert, T. T.
Evaluation of techniques for inoculating corn with *Physoderma maydis*.
Phytopathology 1952 : **42** : 284–85. (Abst.).

In connexion with the field evaluation of the brown spot resistance of maize lines, the following aspects of the technique of inoculation were studied: inoculation with dry sporangia, sporangial suspension in water or suspension of germinating sporangia; incidence of rain; plant height at the time of inoculation; number of inoculations; and concentration of sporangial suspensions.

2679 JENKINS, M. T. and ROBERT, A. L.
Inheritance of resistance to the leaf blight of corn caused by *Helminthosporium turcicum*.
Agron. J. 1952 : **44** : 136–40.

At the Beltsville Plant Industry Station, Md., inheritance of blight resistance was studied in the F_1 and F_2 of crosses involving 5 resistant maize inbreds, T 528, CI 23, Mo. 21A, NC 34 and L 97, and 3 susceptible inbreds, R 4, 38–11 and K 64; back crosses to resistant and susceptible parents were also effected. Graphs expressing frequency distributions of leaf blight ratings for F_2 and back cross generations show that in crosses between R 4 and resistant inbreds, NC 34 and Mo. 21A transmitted greater resistance than either T 528 or CI 23; L 97 proved intermediate in this respect. Similarly in crosses between NC 34 and each of the three susceptible lines, R 4 transmitted much greater susceptibility than either 38–11 or K 64. In general the F_2 distributions were intermediate between those for both parents, and the back cross distributions were shifted towards the recurrent parent.

Although there is evidence for a complex genetic mechanism controlling blight resistance, it seems probable that NC 34 and Mo. 21A each have a major gene for resistance, while R 4 carried a major recessive gene for extreme susceptibility.

2680 **Corn borer control measures.**
Seed World 1952 : **70** : No. 5 : p. 26.

The Ohio maize hybrids K 62, W 64, C 54 and L 51, possessing relative tolerance of the European corn borer, are recommended to growers in Ohio.

2681 NELSON, O. E. (JUN.)
Non-reciprocal cross-sterility in maize.
Genetics 1952 : **37** : 101–24.

Investigations concerning the genetic basis of nonreciprocal cross sterility in *Zea Mays*, carried out at the Purdue Agricultural Experiment Station, Ind., indicate that many varieties of popcorn which fail to set seed when pollinated by maize possess a cross sterility allele Ga^s at the *ga* locus on the fourth chromosome. Whereas *ga*, *Ga*, or Ga^s pollen will fertilize gametes from *gaga* or *GaGa* plants, only *Ga* and Ga^s pollen sets seed on Ga^sGa^s plants. No maize with any constitution other than *gaga* was found, while Ga^s is widespread among popcorns in the US and South America. The suggestion (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2556) that popcorns are ancestors of the more advanced maize types is discussed, with reference to the competitive advantage of Ga^s pollen tubes over *ga* pollen tubes in stylar tissues of $gaGa^s$ and Ga^sGa^s constitution; it does not therefore seem possible to derive a *gaga* population from any ancestral form in which Ga^s was present. There is, however, a possibility that maize and cross sterile popcorn originated separately from a cross fertile type of popcorn.

The usefulness of the Ga^s allele in breeding programmes is pointed out; where plants of the constitution *gaga* are being bred for kernel characters, contamination by maize pollen can be avoided by incorporating the cross sterility allele into the inbreds in place of *ga*; thus the inbreds will only set seed with their own Ga^s pollen or Ga^s pollen from other inbreds similarly treated. This type of genetic isolation should be particularly valuable for sweet corn breeding.

Further observations on the mechanism of cross sterility have shown that reaction between the diploid style and the haploid pollen tube is involved (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1826); the penetration of *ga* tubes is inhibited in Ga^sGa^s styles and is slowed down in $gaGa^s$ tissues, reducing possible competition with the rapidly growing Ga^s tubes.

2682 TRENTIN, A.
Varietà indigene di mais ed ibridi americani ed italiani. (**Indigenous varieties of maize and American and Italian hybrids**).
Ital. Agric. 1952 : **89** : 174–79.

Trials, in which 47 types of hybrid maize on the Italian market were compared with the two varieties most widely grown in Italy, Marano and Nostrano dell'Isola, were carried out by the N. Strampelli Institute of Technical Agronomy at Lonigo. In addition, the performance of hybrids produced in Italy was compared with that of hybrids from America. Yields, earliness and growth characteristics of the plants were noted. No difference in smut resistance was found between the Italian local maizes and the hybrids. On the whole the hybrid maizes at present on the Italian market have proved more productive than those bred in the USA.

2683 **Maize variety trials.**
Nyasald. Agric. Quart. J. 1951 : **10** : 78–80.

A summary is given of the results of trials comparing open-pollinated varieties from South Africa and Southern Rhodesia with hybrids from Southern Rhodesia and local varieties. Hybrids I, II, and III usually gave higher

yields than the local and introduced open-pollinated varieties, although the differences were not always significant.

2684 LEBEDEFF, G. A., FREEMAN, W. H., PARKMAN, S. B., BROOKS, O. L. and BROWNE, E. B.
Georgia corn performance tests 1950.
Circ. Ga. Agric. Exp. Sta. 1951 : No. 167 : Pp. 15.

The results of trials of maize hybrids and open-pollinated varieties at 17 centres are presented in detail. Two new hybrids, Georgia 103 (cf. Abst. 375) and Georgia 281, have been released. The pedigrees of Ga. 103 and Ga. 281 are [(F 4 x F 3) x (T 61 x T 13)] and [(F 3 x L 90) x (GT 5 x F 2)], respectively. Ga. 281, a white hybrid, outyields Florida W–1 by 17%. In weevil resistance it equals Dixie 18 and Florida W–1. It is a full season hybrid of the same maturity as Whatley Prolific and Florida W–1. It is well adapted to all districts of the Coastal Plain.

2685 IVY, H. W. (JUN.)
Yield trials with corn hybrids in Louisiana, 1948-51.
Bull. La. Agric. Exp. Sta. 1952 : No. 461 : Pp. 15.

The results of recent trials of maize hybrids are summarized. Yellow and white hybrids recommended for north and south Louisiana are listed. Data are given for 1951 on the suitability of several hybrids for mechanical harvesting.

2686 WISER, W. J.
1950 hybrid corn yield tests.
Rep. Ser. Ark. Agric. Exp. Sta. 1951 : No. 23 : Pp. 27.

Data from the 1950 trials of maize hybrids and varieties in Arkansas are summarized.

2687 BURDICK, A. B. and WISER, W. J.
Corn performance test, 1951.
Rep. Ark. Agric. Exp. Sta. 1952 : No. 29 : Pp. 27.

The results of trials of maize in Arkansas are summarized. Hybrids recommended for the different regions of the state are listed.

2688 NEWMAN, J. E., MILES, S. R. and CRANE, P. L.
1951 performance of private and open-pedigree corn hybrids in Indiana.
Sta. Circ. Purdue Univ. Agric. Exp. Sta. 1952 : No. 380 : Pp. 23.

A summary is given of the results of tests of maize hybrids produced by Purdue Agricultural Experiment Station and stations in other states and of hybrids developed by seedsmen.

2689 JUGENHEIMER, R. W., BAUMAN, L. F., ALEXANDER, D. E., WOODWORTH, C. M. and KOEHLER, B.
Experimental corn hybrids tested in 1951.
Bull. Ill. Agric. Exp. Sta. 1952 : No. 551 : 383–404.

The results of tests of experimental double and single maize crosses in Illinois are summarized.

2690 CLAPP, A. L. and TATUM, L. A.
Kansas corn tests, 1950.
Bull. Kans. Agric. Exp. Sta. 1951 : No. 347 : Pp. 45.

A detailed report is presented of recent trials of maize varieties and hybrids in the different areas of Kansas.

2691 **Hybrid maize (corn). Progress in OEEC countries.**
Organisation for European Economic Cooperation, Paris 1952 : Pp. 48.

This report on maize production in Europe, based on enquiries made by two American specialists during 1951, supplements similar investigations carried out in 1949 and 1950 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 290). It outlines the progress made by international cooperation, particularly through organized trials of inbreds and hybrids introduced from the USA, and through meetings for discussing problems involved in breeding hybrids locally, sponsored by FAO (cf. Abst. 1856). The importance of breeding hybrids from locally developed inbreds which are specifically adapted to different European environments is emphasized. Extensive interchange of inbred lines developed in European countries and the Near East is reported, but it is pointed out that, until an adequate system for designating maturity group other than by number of days from planting to maturity is devised, the exact time of maturity of inbreds thus exchanged cannot be indicated. Suggestions are made for an international certification system which will be necessary since it appears that in some countries old maize varieties and intervarietal F_1 and F_2 hybrids are being sold as double cross hybrids, to the detriment of the entire hybridization plan.

2692 FENAROLI, L.
Rapporto sulla sperimentazione maidicola 1950. **(Report on experiments on maize growing 1950).**
Pubbl. Staz. Sper. Maiscolt., Bergamo 1951 : No. 64 : Pp. 49.

In this report (cf. *Plant Breeding Abstracts*, Vol.

XXI, Abst. 2616) experiments on hybrid maize cultivation in Italy and in particular on the progress made in the introduction and distribution of hybrid varieties, are recorded in detail and mainly in tabular form. The work was carried out by the Experimental Station for Maize Cultivation, Bergamo, in collaboration with various other institutions. The material tested included double hybrids, intervarietal crosses, and open-pollinated and local varieties. In addition, 13,683 q. of seed of 24 hybrid varieties were distributed to growers under the provincial control and inspection scheme. On an area of 35,000 ha. the hybrids yielded approximately 500,000 q. more than the local varieties.

Hybrid seed production was increased and the Bergamo Station developed the production of the hybrid types Insubria 1 (= U S 13), Insubria 156 (= Ohio C 92), Insubria 156 (= Iowa 4316) and Insubria 2201 which is an experimental hybrid with orange, vitreous grain. Private companies undertook the production of many other types.

Conversion tables for Italian and American weights and measures are appended to the report.

2693 Rousseau, M.
La culture du maïs-grain. Les résultats obtenus en 1951. (The cultivation of maize for grain. Results obtained in 1951).
Rev. Agric., Bruxelles 1952 : **5** : 235–39.

In continuation of previous research (cf. Abst. 384), trials were conducted at Melle and Lokeren, Belgium, with 18 lines comprising open-pollinated varieties, American hybrids and Dutch hybrids. The Dutch selections and CIV2 and CIV7 in particular gave high yields, and maize breeding promises well in Belgium and in Holland; the following commercial varieties can be recommended: Wisconsin 240, Nodak 301, Wisconsin 255 and Goudster. The last named is slightly earlier than Wisconsin 240 and if harvested by machinery should be cut without delay owing to a tendency to lodging.

BARLEY

2694 Johnson, L. P. V.
Breeding barleys for prairie conditions.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 25–30.

Breeding barley for cultivation in the Canadian Prairies is briefly discussed with particular reference to malting quality, yielding capacity and resistance to loose smut.

2695 **Progress Report of the Midwest Barley Improvement Association 1950** : Pp. 40. (Mimeographed).

Kemble (Swenkem) barley. (*pp. 26–27*).

Kemble was developed from a stray plant with white aleurone by W. Kemble, East Grand Forks, Minn. The variety was later identified as the barley Gartons grown in Canada, or as a type closely resembling Gartons. Official trials have indicated that Kemble is inferior to Kindred in field, kernel and malting characteristics and should be classed only as a fodder barley.

Olli barley not adapted to Midwest. (*p. 27*).

Olli is not recommended to farmers in the Midwest. Comparative data are provided on the malting quality of Olli, Edda and Vega grown in Alaska.

Research fellowships and grants-in-aid for barley improvement. (*pp. 28–29*).

Projects supported by the Association include: at the University of Minnesota a study of the kernel and field characteristics and malting quality of hybrids between Mars and several other barleys, undertaken with the aim of developing varieties combining the stiff straw, stem rust resistance and earliness of Mars with the greater yielding ability, kernel size and diastase content of the other parents; and at the North Dakota Agricultural College analysis of the inheritance of awn adherence and other characters, and breeding of a variety combining the stiff straw and smut resistance of Titan with the stem rust resistance and malting qualities of Kindred.

New races of stem rust. (*pp. 29–30*).

The hitherto stem rust resistant barleys Chevron, Peatland, Mars, Kindred and Moore are susceptible to race 59. Intensive studies of the world collection of some 6000 types of barley are required in order to discover sources of resistance.

2696 **Report of the Midwest Barley Improvement Association Milwaukee, Wisconsin 1951** : Pp. 41.

Acceptable varieties of malting barley for planting in 1952. (*pp. 22–23*).

On account of its unsatisfactory brewing qualities and other characteristics Moore (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1801) has been removed from the list of acceptable varieties of malting barley for the midwestern

region. The advantages and disadvantages of acceptable varieties are briefly indicated; varietal recommendations are made for the different states (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2660).

Research assistantships and grants in aid for barley improvement. (*pp. 25–29*).

In the breeding project supported by the Association at the University of Minnesota, hybrid selections from several areas are under investigation, e.g. Mars x Kindred, Mars x Montcalm, Moore x Montcalm and Moore x Imperial. All progenies are being studied under conditions of artificial epidemics of stem rust and spot blotch. Effective selection for stem rust resistance in material carrying the Peatland Chevron type of resistance can only be carried out in the absence of race 59. Among the results from correlation studies of crosses involving Mars as the common parent were the following highly significant correlations. Positive correlations between generations were attained for average kernel weight, uniformity of kernel weight, general fertility of the spikelets, and fertility ratio (number of lateral spikelets/number of central spikelets), but much of the variability was nonheritable. In the F_5 positive correlations occurred between average kernel weight and bushel weight, average kernel weight and yield, general fertility and yield, and bushel weight and yield; a negative correlation was detected between bushel weight and uniformity of kernel weight. Much of the total variation was however nongenetic. In the case of criteria of malting quality, a positive association was found between protein and diastatic power; a negative correlation was obtained between protein and extract and also between diastatic power and extract. Positive correlations occurred between average kernel weight and extract, bushel weight and extract, and between yield and extract, whereas negative correlations existed between yield and protein and between yield and diastatic power. None of the undesirable associations were of such magnitude as to preclude selection of a few lines relatively desirable in all respects.

Extensive yield trials of varieties in rod-row and 1/40 acre plots in Minnesota have been carried out. The malting barleys Wis. 38 (Barbless), Kindred, Montcalm and Moore, and the fodder barleys Vantage, Feebar and Plains have given consistently high yields at most places.

At the North Dakota Agricultural Experiment Station, special attention is being given to promising selections of Titan x Kindred.

In breeding at the South Dakota State College, a study is being made of yielding capacity and other agronomic characters in types with blue-green and yellow-green leaves and in selections from crosses between these two types. One of the characters under investigation is resistance to high temperature under controlled conditions in the greenhouse.

Report on barley improvement presented at 75th Annual Convention, United States Brewers Foundation (*pp. 31–35*).

The varietal situation of malting barley in the midwestern states is among the subjects discussed.

2697 **Report of the Barley Improvement Conference, Hotel Nicollet, Minneapolis, Minnesota 1951** : Pp. 48. (Mimeographed).

Wiebe, G. A. Barley variety tests, Upper Mississippi Valley Uniform Nurseries. (*pp. 28–29*).

The main results of the eighth annual variety trial in the Mississippi Valley are given. Vantage and Trebi have produced the highest average grain yield for the whole period of testing; Mars has shown the highest bushel weight. For straw strength Mars, Moore and Vantage have been outstanding.

Dickson, A. D. Barleys grown in Mississippi Valley Nursery. (*pp. 29–34*).

Information is provided on the barley and malt properties of eight varieties grown during the last four years. Some interesting yearly relationships between quality factors were detected.

Burkhart, B. A. Commercial brewing tests of Kindred, Montcalm, Moore and Wisconsin 38 barleys of the 1949 crop. (*pp. 34–35*).

The results of malting and brewing tests on the above varieties are described (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2660).

Quisenberry, K. S. Cereal research in the United States. (*pp. 36–48*).

The survey includes breeding work. In the search for sources of resistance to Hessian fly in barley, resistant varieties so far discovered at Beltsville, Md. and La Fayette, Ind. nearly all came from North Africa, with the greatest number from Egypt (cf. Abst. 1930). The world barley collection has been grown in various localities for tests of Hessian fly resistance; some varieties have shown promising resistance in Florida. In considering future activities, attention is drawn to the successful and extensive

use of the back cross method in barley breeding in California; possibly the method should be more widely used in the midwestern states.

2698 Jensen, N. F., Tyler, L. J. and Johnson, A. A.
Cornell develops barley resistant to powdery mildew.
Fm. Res. 1952 : **18** : No. 2 : p. 2.

Further information concerning Erie barley (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2460) includes details of its origin by selection from a cross between Alpha and the mildew resistant Goldfoil.

2699 Grafius, J. E., Nelson, W. L. and Dirks, V. A.
The heritability of yield in barley as measured by early generation bulked progenies.
Agron. J. 1952 : **44** : 253–57.

The variance in yields of early generation bulked hybrid progenies has been analysed. The total genetic variance was separated into additive or heritable genetic variance and a nonheritable fraction ascribed to dominance deviations and epistasis. In the F_1 the nonheritable fraction constituted the major proportion of the genetic variance. In the F_3, this fraction decreased in comparison with the heritable variance. Early generation testing of bulked progenies does not appear to be valuable as a means of selecting entire crosses for yield. Data on F_4 bulked material resulting from selection of F_2 individual plants and F_3 progenies suggested that selection for yield within the F_2 is not feasible.

2700 Covas, G.
Herencia del carácter "*irregulare*" en cebada. (**Inheritance of the "*irregulare*" character in barley**).
Rev. Argent. Agron. 1951 : **18** : 231–33.

Fertile hybrids were obtained in crosses of *Hordeum irregulare* with both *H. spontaneum* and *H. vulgare* (*s. str.*) and normal meiosis with 7 bivalents was observed in both hybrids. In the former cross the *irregulare* character was recessive to *distichum*, and in the F_2 29 *distichum*, 58 *intermedium* and 20 *irregulare* or *hexastichum* individuals occurred. The dominant character fragile rachis was inherited independently.
In the cross with *H. vulgare* the *irregulare* character was dominant and is evidently allelic with *Vv*; it is pointed out that the diagnostic features distinguishing these so-called species behave in a simple Mendelian manner.

2701 Covas, G.
Número de cromosomas de las especies de "*Hordeum.*" (**Chromosome number of *Hordeum* species**).
Rev. Argent. Agron. 1952 : **19** : 52–53.

A revised list of chromosome numbers of the *Hordeum* species is given allowing for certain recent corrections in the identification of the species. Some of the numbers have been established from herbarium specimens on the basis of stoma and pollen size.

2702 Caldecott, R. S. and Smith, L.
The influence of heat treatments on the injury and cytogenetic effects of X-rays on barley.
Genetics 1952 : **37** : 136–57.

This paper comprises a full account of the investigations summarized in Abst. 1917.

2703 Takahashi, R.
Studies on the classification and the geographical distribution of the Japanese barley varieties. II. Correlative inheritance of some quantitative characters with the ear types.
Ber. Ohara Inst. 1951 : **9** : 383–98.

The characters of normal *vs.* semibrachytic (uzu) and lax *vs.* dense ears in Japanese barleys depend upon the independently inherited gene pairs *Uzuz* and *Ll*, respectively. Quantitative characters were studied in four ear types, normal-lax, normal-dense, uzu-lax and uzu-dense. Lengths of ear, rachis internode, empty glume, grain, rachilla axis, culm and coleoptile were greatest in the normal-lax type, and least in the uzu-dense ear; the other two types were intermediate for this character. These correlations between quantitative characters and ear type are ascribed to pleiotropic effects of *Uzuz* and *Ll*. Attention is drawn to the regularities in the geographical distribution of ear types in Japan; these suggest that the ecological adaptation of the different genotypes is well-established. Use of coleoptile length as an indication of ear type would simplify breeding.

2704 Takahashi, R. and Yamamoto, J.
Studies on the classification and the geographical distribution of the Japanese barley varieties. III. On the linkage relation and the origin of the "uzu" or semi-brachytic character in barley.
Ber. Ohara Inst. 1951 : **9** : 400–10.

The factor pair *Uzuz* which determines the characters normal *vs.* semibrachytic ears has

been found to belong to linkage group VI, probably in the order *uz-ac-xc-an-xs*. At present the uzu or semibrachytic type occupies 80% of the total barley acreage in Japan. A survey of the geographical distribution of naked and hulled barleys of the normal and semibrachytic types occurring in Korea has led to the view that uzu was originally introduced into that country from Japan. Uzu barley is rarely found outside Japan and Korea; it is suggested that it originated through gene mutation in a normal variety, probably in southern Japan.

2705 Latčenko, V. N. and Niščiĭ, I. A.
(A branching winter barley).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 72–74. [Russian].

Forms of barley with branched ears have been selected from a winter variety Štamm 12 [Strain 12], and experiments to fix their inheritance are in progress at the Moldavian State Breeding Station. The methods consist of training upon good soil and removal of all but two culms per plant. The second generation had tall, thick straw and produced 12 grains more per ear than the initial variety, but the 1000 grain weight was 2·8 grm. lower.

2706 Bergal, P.
Sur la valeur taxonomique des lodicules ou glumellules de l'orge (*Hordeum sativum* Jess). [**On the taxonomic value of the lodicules or glumellules of barley (*H. sativum* Jess)**].
CR Acad. Sci. Paris 1947 : **224** : 489–91.

The author's system of classification of cultivated barley varieties based on lodicule form is outlined (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2574). In addition to the groups *Latisquamosae* and *Parvisquamosae* already established, two other categories are described: (1) the *compactum* type, containing barleys of var. *erectum* with large lodicules, and (2) the *zeocompactum* type, including barleys with similar lodicules from var. *zeocrithum*.

2707 Hutchinson, A. O.
Selection of malting barley and drying problems in Scotland.
Brew. Guild J. 1952 : **38** : 144–151.

Varieties of good malting quality suitable for conditions in Scotland and promising selections on trial at Boghall are mentioned. Reference is made to the new Danish variety, Carlsberg, claimed by the European Barley Commission to be of better malting quality than any other Scandinavian barley. Carlsberg combines the high yields of the stiff-strawed Danish Maja with the grain quality of Prentice; it has medium straw which is strengthened by enveloping leaf sheaths reaching to the base of the ear.

2708 **Report of the Barley Improvement Conference Minneapolis, Minnesota, February 12, 1952:** Pp. 33.

Wiebe, G. A. Report on uniform barley nursery, Upper Mississippi Valley, 1951. (*pp. 1–3*).

Comments are made on the yield performance of varieties grown in tests at 16 centres in the North Central states. Kindred produced the highest average yields of grain, followed by Montcalm, Mars, and Moore. No significant differences in yield and other agronomic characters were obtained between lines isogenic for white and blue aleurone colour. In a comparison between isogenic six-row and two-row barleys large significant differences in yield, bushel weight, lodging and plant height were recorded.

Dickson, A. D. Report on malting quality of samples from uniform barley nursery, Upper Mississippi Valley, 1951. (*pp. 3–10*).

Data on the malting properties of Manchuria, Moore and other varieties are tabulated and discussed. Aleurone colour has no influence on barley and malting quality.
Lines isogenic for the six-rowed and two-rowed condition have shown differences in malting properties; the data are however preliminary.

Burkhart, B. A. Report of plant scale malting and brewing tests of barley varieties. (*pp. 11–12*).

The results of commercial malting and brewing tests on Kindred, Montcalm and Moore are reported. Because of its unsatisfactory performance Moore has been removed from the list of barleys approved for malting (cf. Abst. 2696).

2709 Horne, F. R.
Development of new varieties of malting barley.
J. Inst. Brew. 1952 : **49** : 185–88.

A survey is given of barley improvement, chiefly in England, reference being made to barleys of the Archer type, the trial performance of introduced Scandinavian varieties, hybrids between British varieties and Scandinavian barleys developed at the Cambridge Plant Breeding Institute and in Dublin, winter varieties and fodder barleys. Promising hybrids now under test include: Beorna, 34/2 and 34/15, all developed from Spratt-Archer x Kenia; HB 35/99/4/10 (Kenia x Plumage-Archer); HH

14/4/4 (Kenia x Goldthorpe); and HB 40/66/5 (Maja x Spratt-Archer).

2710 Meredith, W. O. S. and Anderson, J. A.
Malting quality of Canadian barleys.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 62–66.

The results of malting tests carried out for 11 years on samples of the commercial grades 2 and 3 of Western Canadian six-row barleys show that the quality of these grades has improved. This improvement is attributed to the replacement of less desirable varieties by improved barleys; tribute is paid to the role of the breeder in the shifts in the varietal situation.

2711 Cowan, P. R.
The development of barley varieties in Canada.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 23–24.

A brief historical account of breeding work on malting barley in Canada is provided.

2712 Harrison, T. J.
Barley improvement in Canada.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 21–22.

An historical account is given of improvement of malting barley by breeding and other methods and of the various cooperating organizations concerned.

2713 McRostie, G. P.
The rise and decline of O.A.C. 21 barley.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 19–20.

A history is given of the variety OAC 21, the leading malting barley in Canada during the period 1917 to 1948. Montcalm (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 530) has now replaced OAC 21 as the most extensively registered variety. New malting varieties recently developed involve OAC 21 or other Manchurian barleys in their ancestry.

2714 Bendelow, V. M.
Malting and prediction tests.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 59–60.

Procedures used in the prediction and malting tests for grading breeding material at the Barley Improvement Institute, Winnipeg, Man., are outlined. In the prediction tests, carried out on preliminary breeding lines, data on 1000 kernel weight, nitrogen content, barley extract and saccharifying activity are obtained as indices of malting quality.

2715 Ladish, H. N.
Improving midwestern barley.
Amer. Brewer 1951 : **84** : No. 9 : 43–44, 46 [From Wallerstein Laboratories Communications 1952 : **15** : No. 48 : p. 85].

The evaluation of hybrid selections, undertaken by the US Malt Research Institute, is briefly described. Reference is made to preliminary chemical and physical analyses of kernels from a single ear; if the selection shows promise it is increased by the breeder for malting and brewing trials. Only a few selections prove superior to existing varieties; these undergo further trials for yielding ability, hardiness and disease resistance before final approval. Consequently there are but eight approved malting varieties grown in the seven midwestern states and all are of outstanding quality.

2716 **Report of the Barley Committee of the European Brewery Convention. Trials 1950** : Pp. 61. (Mimeographed).

Following the first general meeting of the Barley Committee in London in 1949, a number of field trials with malting varieties were undertaken in Belgium, Denmark, Éire, England, France, Holland, Norway and Sweden during 1950, using Kenia as a standard. Detailed results of each trial and analyses of malting and brewing qualities of ten varieties grown in more than one country are presented. Highest yields were given by Herta and Rika; these varieties also had the stiffest straw, but were not outstanding in malting quality; Earl was consistently superior in the latter respect but gave low yields with weak straw. Although Carlsberg lodged readily in unfavourable conditions it was the only variety combining high yields with good malting quality in each trial.

During a discussion of results at the 1950 meeting in Rotterdam, attention was drawn to the new crosses Plumage Archer x Kenia and Spratt Archer x Kenia 17. A recommendation to avoid using hyphenated names or numbers for new varieties was supported. A detailed analytical method devised by Sandegren to enable breeders to evaluate the malting and brewing qualities of new hybrids at an early stage is to be more widely tested.

2717 Litzenberger, S. C. and Bensin, B. M.
Edda barley for Alaska.
Circ. Alaska Agric. Exp. Sta. 1951 : No. 16 : Pp. 10.

Details are given of the performance of the Swedish barley Edda (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 849) under Alaskan conditions; in comparison with the commonly

grown varieties Olli and Trapmar, Edda gives superior grain yields, is of better malting quality than Olli, matures a week earlier than Trapmar and shows greater resistance to lodging than either.

2718 Frey, K. J., Robertson, L. S., Cook, R. L. and Down, E. E.
A study of the response of malting barley varieties to different fertilizer analyses.
Agron. J. 1952 : **44** : 179–82.

At several localities in Michigan grain yields from Wisconsin 38 and Bay were increased during 1947 by application of fertilizers, whereas OAC 21 showed no response to similar treatment. In 1949 yields of Moore were considerably reduced when fertilizers were used.

2719 Poehlman, J. M.
Breeding winter barley for hardiness and disease resistance.
Econ. Bot. 1952 : **6** : 176–84.

Problems of breeding barley for the area in the USA where varieties of the Tennessee Winter types are now grown are discussed, chiefly with reference to work in Missouri. The rough-awned Tennessee Winter barleys are the most hardy types available and their ecological adaptation to the northern area of barley cultivation is long established; these types must therefore form the basis of breeding for improved hardiness. They also provide the best source of resistance to scald (*Rhynchosporium Secalis*). Among the generally less hardy hooded Tennessee Winter types, North Carolina 26 and selections of Missouri Early Beardless are exceptional for their hardiness and are also smut resistant. Use of the rough-awned Tennessee Winter types and these hooded strains appears to offer the best method of combining hardiness and disease resistance. Crosses already made between Missouri Early Beardless selections and rough-awned types have yielded promising strains, one of which, Mo. B–400, has already been distributed. Other possible sources of additional genes for hardiness and disease resistance are briefly discussed.

2720 von Wettstein, D.
Halmaufbau und Standfestigkeit bei *erectoides* Mutanten der Gerste. (**Culm structure and standing capacity in *erectoides* mutants of barley**).
Hereditas, Lund 1952 : **38** : 345–66.

The *erectoides* 23 mutant of Bonus barley yields 5% less grain than Bonus with 250 kg. of saltpetre per ha. but with 500 kg. it equals Bonus. It is extremely resistant to lodging and an apparatus is described whereby the resistance to bending of the straw can be measured by placing weights at a distance of 1 cm. from the end of a cut internode. Comparisons of *erectoides* 23 with the original Bonus showed it to be significantly stronger in the top two internodes. The area of the total cross section and of the pith cavity of the two top internodes was also greater; the number of vascular bundles was the same, but the area of the bundles in cross section was greater and the mutant had a larger area of sclerenchyma; this was due to the greater size of the sclerenchyma cells, and measurements of other cells in the vascular bundles indicated that they were also larger in the mutant, both in the internodes and in the nodes and leaf sheaths. Other features which contribute to the greater standing capacity of the mutant are its shorter stature, the lower internodes in particular being reduced in length.

2721 Nishikado, Y., Takahashi, R. and Hiura, U.
Studies on the disease resistance in barley. I. Varietal differences in resistance to powdery mildew, *Erysiphe graminis* D.C. f. *Hordei* Marchal.
Ber. Ohara Inst. 1951 : **9** : 411–23.

A report is given of the results of greenhouse tests carried out on seedlings of many barley varieties for resistance to the powdery mildew prevalent in the Okayama prefecture. The most resistant barleys originated from Europe, America, and the northern Tohoku regions of Japan. Resistance was scarce among varieties from the south Kanto districts of Japan, China and southern Korea. Most of the barleys from northern Korea, Manchuria, Russia and south-western Asia showed an intermediate reaction. The majority of wild barleys also exhibited an intermediate degree of infection. It is suggested that the hulled resistant varieties of eastern Asia were originally introduced from Europe, America and Russia. This suggestion is supported by information on the geographical distribution of short-haired rachilla and hairless leaf sheath and on the association of these properties with mildew resistance. The character of resistance apparently does not exist among the naked eastern Asiatic varieties.
Four naked Japanese varieties were resistant but are however hybrids derived from resistant hulled varieties. This fact points to the possibility of breeding mildew resistant naked barleys adapted to the different localities of Japan.

2722 Shebeski, L. H.
New techniques in barley breeding.
Agric. Inst. Rev., Canad. 1952 : **7** : No. 2 : 26–27.

An account is given of the attempts being made to improve the malting barley Montcalm (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 530) by back-crossing and induction of mutations by X irradiation at the Department of Field Husbandry, University of Saskatchewan. Resistance to loose smut and rust has been transferred to this variety by back-crossing. It may also be possible to introduce resistance to shattering and rachis breakage and also early maturity by back-crossing. As a result of X irradiation mutants showing earliness and others with stronger straw have been secured, which maintain the malting quality of the original variety; the mutants require to be tested for yield. In choosing suitable parents for crosses to combine the desired characters, it appears that in the case of malting quality a choice should be made of parents having complementary defects in malting properties, with a mean equal to the desired level of quality.

2723 Wu, Y. S.
Production of stem-rust sori on albino barley.
Phytopathology 1952 : **42** : 177–78.

An albino strain of barley grown at the University of Saskatchewan showed resistance to infection by a culture of *Puccinia graminis* var. *Tritici* which produced numerous sori on variegated and normal green leaves. When inoculated albino leaves were fed with sucrose solution, however, large numbers of sori developed, indicating that rust reaction is independent of the presence of chlorophyll.

2724 **Goliad barley.**
Seed World 1952 : **70** : No. 5 : p. 32.

Goliad, a variety suitable for winter forage or grain production, has been developed for southern Texas from the F_3 of Juliaca x Peatland. The new barley combines the leaf rust and powdery mildew resistance of Juliaca with the resistance to stem rust and *Helminthosporium* blotches shown by Peatland.

2725 Derscheid, L. A., Stahler, L. M. and Kratochvil, D. E.
Differential responses of barley varieties to 2,4-dichlorophenoxyacetic acid (2, 4-D).
Agron. J. 1952 : **44** : 182–88.

Spartan, Plains, Feebar, Kindred, Odessa, Manchuria and Barbless were treated with the butyl ester, amine and sodium salt of 2,4-D at different localities in South Dakota from 1947 to 1949; Tregal was also tested in 1947 and Moore in 1949. Morphological abnormalities and yield reductions were most prevalent in all varieties after treatment with the butyl ester. Analyses of variance in grain yield suggest that Barbless and Moore are more susceptible than Spartan, Odessa, Manchuria or Tregal. Yield reductions in early varieties, after treatment at early growth stages, were associated with a decrease in the number of seeds per ear; whereas yield reductions in late varieties, treated at the five-leaved stage, were mainly caused by the formation of fewer inflorescences.

MILLETS AND SORGHUMS

2726 **Sorghums and millets, rice and groundnuts.**
Nyasald. Agric. Quart. J. 1951 : **10** : 80–83.

The results of trials of 111 sorghums from various parts of Africa, carried out at the Lilongwe station and elsewhere in Nyasaland, suggest that medium and late maturing tall varieties are the most promising. In a variety trial of *Eleusine coracana* at the Mbawa Station near Mzimba, Phagalala and Fumbata gave the highest grain yields of 1937 and 1880 lbs. per acre respectively.

The local rice variety Faya has remained the most suitable type for Nyasaland in comparative trials with varieties from other countries. In most localities, the groundnut Gambia has given the highest yields.

2727 Korčenjuk, Ja. T.
(The biology of flowering of millet and hybridization methods).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 77–78. [Russian].

A brief account of investigations at the Veselyĭ Podol Breeding Station is given. It contains a reference to productive large-grained hybrids, obtained by intervarietal hybridization and training upon rich soil for several generations.

2728 Popov, G. I.
(The causes of persistent productiveness of millet varieties).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 3 : 31–40. [Russian].

Investigations at the Priaraljskaja Station of the USSR Institute of Plant Industry and the

Kazanj State Breeding Station suggest that persistent high yields of some millets, including Dolinskoe 86 and Kazanskoe 176 [Kazanj 176], are associated with intravarietal heterogeneity.

2729 Davydovič, S. S.
(*Setaria* at the North Osetian State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 71–72. [Russian].

Trials of several forms and varieties, including some originating from China, are reported. Two early varieties, Harjkovskaja Krasnozernaja [Harjkov Red Grain] and Kunak Krasnyĭ [Red Friend], and a mid-season variety Kubanskaja Belaja 73 [White Kubanj 73] showed most promise.
Selection work with Kubanskaja Belaja 73 has begun.

2730 Mjagkov, N. V.
(Methods of increasing the yield of millet).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 25–31. [Russian].

Mention is made of a productive large-grained variety Pučežskoe Želtoe [Yellow Pučež] selected from a local population in the Pučež district.

2731 Camus, A.
Panicum nouveaux de Madagascar. **(New *Panicum* species from Madagascar).**
Bull. Soc. Bot. Fr. 1952 : **99** : 63–65.

Five new species are described: *P. mandrarense, P. ikopense, P. ambongense, P. bicuspidatum* and *P. Decaryanum.*

2732 Stephens, J. C. and Quinby, J. R.
Yield of a hand-produced hybrid sorghum.
Agron. J. 1952 : **44** : 231–33.

Hybrid seed for experimental purposes was produced at the Chillicothe substation, Texas, by hand-pollinating male sterile Texas Blackhull kafir with Day Selection GC 38311. In April plantings the average yield of the F_1 hybrid over a six-year period exceeded that of the highest yielding variety by 10% and the average of all varieties by 27%. In an eight-year period of June plantings, the hybrid surpassed the highest yielding variety and the average of all varieties by 20% and 40%, respectively. The hybrid, although not ideal, would be acceptable as an early grain sorghum for combine harvesting.

2733 Jones, M. D. and Sieglinger, J. B.
Effect of the waxy gene on grain yields of sorghum.
Tech. Bull. Okla. Agric. Exp. Sta. 1952 : No. T-44 : Pp. 15.

The genes for waxy and starchy endosperm segregated on a monohybrid basis with a χ^2 probability of 0·87. The expected percentage of waxy plants was however consistently lower than expected; this deficiency is attributed to a differential rate of pollen tube growth. Homozygous starchy genotypes outyielded homozygous waxy sorghum by 10% in both individual plant tests and field plots. Heterozygous genotypes gave intermediate yields. In 1000 grain weight the starchy form exceeded waxy sorghum by 0·77 grm., and in bushel weight by 1·2 lbs. Possibly the adverse effect of the waxy condition upon yield and weight of grains is due to the linkage of undesirable genes with the gene for waxiness.

2734 Ciccarone, A. and Malaguti, G.
Prime prove di campo e di laboratorio per la lotta contro *Sphacelotheca sorghi* (Lk.) Clint. e per la conoscenza della sua biologia in Venezuela. [**Preliminary field and laboratory tests on the control of *Sphacelotheca sorghi* (Lk.) Clint. and for obtaining knowledge of its biology in Venezuela**].
Riv. Agric. Subtrop. 1950 : **44** : 145–77.

Information is included on the degree of resistance of sorghum varieties grown in Venezuela to *S. Sorghi, Cercospora Sorghi, Gloeocercospora Sorghi* and *Helminthosporium turcicum.*

RICE

2735 **World catalogue of genetic stocks of rice. Supplement No. 2.**
FAO, UN, Rome 1952 : Pp. 19.

A further supplement (cf. *Plant Breeding Abstracts*, Vol. XXII, Abst. 420) gives details of genetic stocks which have become available for breeding purposes since the catalogue was first published (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2351).

2736 Vaillant, A.
La riziculture en Italie du nord. **(Rice cultivation in northern Italy).**
Agron. Trop. 1952 : **7** : 64–79.

One section of this record of a tour in the rice growing region of northern Italy deals with (1) the measures taken there to maintain a supply of high grade seed for the growers by line selection,

acclimatization and hybridization; and (2) objectives of Italian breeders with special reference to the Vercelli Experimental Station.

2737 Silva, M. Vianna e
Aspects du comportement héréditaire de la pigmentation anthocyanique dans le riz. (**Aspects of the hereditary behaviour of anthocyanin pigmentation in rice**).
Genet. Iber. 1950 : **2** : 323–29.
In a cross of the variety Mantova, in which the apical teeth were straw coloured, with Muga, in which they were red, monohybrid segregation was observed in the F_2 and F_3 generations, red pigmentation being conditioned by the dominant gene *R*.
In the cross Allorio x Arroz da Terra [Local Rice], both of which had green nodes, the F_1 had purple nodes and the F_2 segregated for two complementary factors *V* and *N*.

2738 **Annual Report of the Department of Agriculture, Colony of Sierra Leone, for the year 1949** (1951) : Pp. 43.
At the Rokupr Experimental Station, selection and multiplication of swamp rices continued. Classification of local rices is in progress. Mass selection of white-grained strains of upland rice was carried out.

2739 Grillot, G.
Expérimentation rizicole au Maroc. (**Experimentation on rice in Morocco**).
Terre Marocaine 1950 : **24** : 489–93.
The early history of rice cultivation in Spanish and French Morocco is outlined and some preliminary results of variety trials conducted during 1948–49 at Rabat, Sidi-Slimane and Ouled-Ameur are recorded. From 143 to 148 varieties including material from Italy, Portugal, Spain and the Niger Province, were tested for yield, earliness and resistance to lodging.
Among the most promising varieties were Ardizzone for the coastal region and Sornavari for the interior. The latter variety, though very productive, is a late rice and subject to lodging. Other varieties worth testing further are: Ostiglia, Nero Vialone, Madagascar 0858A and Balilla, which is specially resistant to lodging.

2740 Jacobs, K. F.
Colchicine behandeling van rijst. (**Colchicine treatment of rice**).
Landbouwk. Tijdschr., Wageningen 1952: **64** : 155–62.
The author records in detail the results of various methods of treating rice with colchicine. Colchicine injections above the growing point appear to promote polyploidy.

2741 Mou, T. S., Yao, Y. T., Liu, L. V. and Chen, Y. T.
(**A comparative study of respiration in seedlings of *hsien* and *keng* rices**).
Nungyeh Yenchiu (Agric. Res.) Taipeh 1951 : **2** : No. 2 : 32–43. [Chinese].
Respiration rate of germinating seedlings has been studied in 12 Taiwan *horai* rices (var. *japonica*), 11 Chinese nonglutinous *hsien* rices (var. *indica*) and 3 Taiwan *indica* forms. In general, the respiration rate was considerably higher in the *indica* varieties.

2742 Capinpin, J. M. and Magnaye, A. B.
Hybridization of cultivated and wild rice.
Philipp. Agric. 1951 : **34** : 219–29.
At Los Baños, only 1·6% seed set was obtained in a cross between the variety Fortuna of *Oryza sativa* and a strain of the wild rice *O. minuta* from Manila. The low percentage fertility is attributed to incomplete development of the anthers of *O. minuta* and a consequently high proportion of sterile pollen grains. No hybrids were obtained from the reciprocal cross, using Fortuna pollen. The F_1 hybrids proved intermediate between the parent species in respect of rate of germination, length of tillers, length and breadth of grain and in times of flowering and maturity, but the absence of awns characteristic of Fortuna proved dominant over the awned condition of *O. minuta*.

2743 Sampath, S. and Ramanathan, K.
Pollen grain sizes in *Oryza*.
J. Indian Bot. Soc. 1951 : **30** : 40–48.
Analyses of pollen grain diameters indicate that the large increase in the size of grains produced by autopolyploid types of *O. sativa*, compared with diploid forms, may serve as a convenient criterion for determining the effectiveness of treatments applied to induce polyploidy.

2744 Steeves, T. A.
Wild rice—Indian food and a modern delicacy.
Econ. Bot. 1952 : **6** : 107–42.
An account is given of wild rice (*Zizania aquatica*), with reference to its taxonomy, ecological requirements, geographical distribution, production and uses in the USA and Canada. Its variability suggests that it might be possible to select strains with greater tolerance of drying out of the seed or even with the ability to grow in terrestrial locations, and thus

bring about wider utilization of the species. If a nonshattering strain could be developed, wild rice might have an agricultural value.

2745 Mou, T. S. and Yao, Y. T.
(Preliminary investigations on the usefulness of serological reaction to ascertain the affinity between rice and other cereal types).
Nungyeh Yenchiu (Agric. Res.) Taipeh 1950 : **1** : No. 1 : 1–6. [Chinese].

Initial results are published on serological relationships between a series of rice varieties classified as nonglutinous *keng* rices, nonglutinous *hsien* rices, and southeast Asiatic rices, and a single variety each of wheat and barley. The results showed that affinity as measured by serological reaction cut across the classification into *keng* and *hsien* rices, equated by the author with the botanical varieties *japonica* and *indica* respectively.

2746 Oka, H., Lu, Y. C. and Tsai, K. H.
Phylogenetic differentiation of the cultivated rice plant. I. Varietal variations of various characters.
Nungyeh Yenchiu (Agric. Res.) Taipeh 1951 : **2** : No. 3 : 1–31.

Some 120 varieties collected from different parts of eastern Asia were studied from 1943 to 1950 at the former Taichung Agricultural College and the Taiwan Provincial College of Agriculture, China. Discontinuous variation was observed in respect of awnlessness and presence of awns more than 20 mm. long, glume colour after soaking seeds in 1·5% phenol, resistance of young seedlings to treatment with 0·05–4·0% $KClO_3$, and survival of young seedlings after exposure at 1° C for 1–5 days and under conditions of drought for 5–6 days. It was possible to separate two groups of varieties; the awnless types showed dark colour reaction with phenol, susceptibility to $KClO_3$ and low temperatures but a high degree of resistance to drought, whereas awned rices possessed characteristics contrary to the above. Geographical distribution of varieties also supports these phenotypic distinctions; awnless varieties are generally found in China, India and Indochina while varieties with awns are scattered among the islands of the western Pacific; consequently the two phenotypically distinct groups have been designated continental and insular, respectively.

Within the insular rices intervarietal correlations have been observed with respect to the degree of destruction caused by KOH, the ratio between length and width of unhulled grain and the length of the first internode. Based on these differences, two minor groups have been distinguished and named tropical insular and temperate insular according to their geographical distribution, which again supports these distinctions.

It is noted that the phenol reaction is controlled by a single dominant gene; genetic determinants of associated characteristics have not yet been investigated.

2747 Li, C.-S. and Chiu, S.-F.
(A study of the gall fly *Pachydiplosis oryzae* Wood-Mason).
Nungyeh Yenchiu (Agric. Res.) Taipeh 1951 : **2** : No. 4 : 1–13. [Chinese].

It is noted that, among the several thousand Chinese varieties studied, upland varieties tended to be less infested with the above pest than irrigated varieties, and that, among the latter, early varieties were less infested than late varieties.

FORAGE GRASSES

2748 **Report of the meeting of the Western Forage Crops Committee of the Dominion Experimental Farms Service held in Swift Current, Sask., June 11th, 12th and 13th, 1951** : Pp. 135. (Mimeographed).

The following papers of interest to plant breeders were among those presented at the conference.

Peake, R. W. Resistance to bacterial wilt. (pp. 9–10).

Methods of making wilt resistant selections from a polycross nursery of clonal lines of lucerne are outlined, with data on the performance of selections made at the Wilt Elimination Nursery, Lethbridge, Alta., since 1945.

Bolton, J. L. Review of progress in breeding alfalfa. (pp. 11–14).

Combined observations from 1947 to 1950 at Saskatoon and Lethbridge on the incidence of wilt among progenies of 15 selected clonal lines of lucerne showing freedom from wilt have shown that only 4 are capable of transmitting a high degree of wilt immunity to intercrossed and outcrossed progenies. These four strains, S–42–81 from Ladak, S–45–30 from Viking, and S–45–36 and S–45–42 from Turkestan, are to be included in breeding programmes which aim to combine freedom from wilt with crown rot resistance.

Heinrichs, D. H. Progress in breeding alfalfa for the creeping rooted habit. (pp. 15–18).

Tabulated data are presented on the combining ability of plants with creeping roots selected

since 1947 at Swift Current, Sask. Selections differed considerably in ability to transmit the creeping habit, but some plants having a good general combining ability were also superior in certain specific crosses, from which offspring with high seed yield, winter hardiness and good forage quality were obtained. The percentage of progeny with creeping roots was much greater from lines which had undergone several generations of selection for this character than from the F_1 of any cross. Several promising creeping selections have also shown a high degree of wilt resistance in trials at Lethbridge.

Murray, B. A study of the creeping rooted habit in alfalfa. (*pp. 19–20*).

Although under field conditions the creeping-rooted habit is not expressed until plants are almost two years' old, a method is here described for identifying potentially creeping seedlings by the number of buds formed at lateral rootlet regions after 12 weeks' growth; selection can therefore be accelerated.

Knowles, R. P. Combining ability studies in bromegrass. (*pp. 29–33*).

The results of numerous trials undertaken at Saskatoon indicate that the performance of open-pollinated progenies corresponds largely with the behaviour of progenies from controlled crosses between selections. Additional evidence of the reliability of open-pollinated progenies, for indicating the combining ability of selections, has been obtained from comparisons between progenies derived from duplicated clonal sources, and from the performance of composite strains resulting from the combination of several superior open-pollinated progenies.

A comparison between forage yields of S_0 and S_1 lines has shown that selection from open-pollinated progenies offers more promise than selection within inbred lines.

Heinrichs, D. H. Variability in intermediate wheatgrass and suggested methods of improvement. (*pp. 34–44*).

Observations made at scattered locations in western Canada from 1947 to 1950 on variation among 34 clonal lines of *Agropyron intermedium* have revealed highly significant differences in plant vigour, spread of creeping roots, winter hardiness, percentage of normal pollen produced and percentage seed set. Studies of the inheritance of certain characters in clonal, open-pollinated and polycross progenies indicate that much improvement in the agronomic value of strains can be achieved by mass selection, using polycross progeny tests to evaluate clones.

Russell, W. A. Corn improvement at Morden—past, present and future. (*pp. 44–50*).

A review of maize breeding at Morden, Man., outlines the methods by which the inbred parents of Morden 74 and Morden 77 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1686) are being improved in order to obtain new hybrids with higher yielding capacity, strong roots and increased smut resistance. Other work includes hybridization between established open-pollinated varieties and unrelated inbreds possessing desirable qualities. New inbreds are being developed from single crosses or back crosses, using locally adapted early lines and late maturing inbreds from further south.

Knowles, R. P. New varieties of grasses and legumes worthy of testing in western Canada. (*pp. 51–53*).

The need for regional evaluation of introductions from Europe and the US is emphasized, with reference to numerous forage grasses and legumes, including two brome varieties Lyon and Lancaster (cf. Abst. 1973) and three varieties of lucerne, Ranger (cf. Abst. 454), Rhizoma (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1841) and Narragansett (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1908).

Clarke, M. F. Some of the considerations involved in the breeding of forage crops for higher nutritive value. (*pp. 54–59*).

In view of the wide variation in protein content within species of forage grasses such as timothy, brome, cocksfoot and Kentucky bluegrass, a programme of selection for high percentage of protein is recommended.

Knowles, R. P. Comparative results of single plant, single row, and solid seeded plots. (*pp. 61–64*).

Tests conducted at Saskatoon from 1941 to 1950 with crested wheatgrass, brome and sweet clover have shown that single row and space planted plots may be useful for the preliminary evaluation of breeding material, but they are not reliable methods for final testing. In many cases, strains grown in single row and space planted plots showed lower coefficients of variability than if tested in solid seeded plots; the yield rating achieved in the latter was rarely maintained in either single rows or space planted plots.

Knowles, R. P. The use of lattice designs in forage crops testing. (*pp. 65–68*).

Data are presented from trials of perennial forage crops at Saskatoon over 6 years to show

that lattice designs give greater efficiency than randomized blocks.

Clarke, M. F. Forage investigations in the northeastern region of the United States. (*pp. 69–74*).

The tabulated summary of cytogenetical research and breeding in Pennsylvania is representative of the area. Current research at the US Department of Agriculture Regional Pasture Laboratory, where the breeding programmes in all states are coordinated, is also briefly reviewed.

Russell, W. A. Seed production of corn and sunflowers in Manitoba. (*pp. 77–80*).

Methods of maintaining the purity of inbred lines of maize and sunflower at Morden, Man., are outlined.

Heinrichs, D. H. Seed setting in creeping rooted alfalfa. (*pp. 88–91*).

Since 1947, improvements in the seed setting ability of lucerne plants with creeping roots have been noted at Swift Current, Sask., as selections have been made from clones capable of transmitting both creeping roots and satisfactory seed set. Strains giving higher seed sets than Ladak, Rhizoma and Grimm have recently been grown at Saskatoon and Snowden from seed produced at Swift Current.

2749 DE CUGNAC, A.
Sur la signification systématique de quelques expériences de croisement entre des Graminées appartenant à des genres éloignés dans la classification: *Elymus*, *Festuca*, *Lolium*, *Dactylis*. (On the taxonomic significance of some hybridization experiments between some members of the Gramineae belonging to the following genera remote from one another systematically: *Elymus*, *Festuca*, *Lolium* and *Dactylis*).
CR Acad. Sci. Paris 1949 : **228** : 422–23.

Embryos that begin to grow but abort early have been obtained from the following crosses: (1) *E. canadensis* x *F. pratensis*, (2) *E. canadensis* x *D. glomerata*, (3) *E. canadensis* x *F. arundinacea*, (4) *E. canadensis* x *L. italicum*, (5) *E. virginicus* x *F. arundinacea* and (6) *E. virginicus* x *L. italicum*. Viable caryopses have been obtained in crosses (3), (4) and (6).

2750 HEDBERG, O.
Cytological studies in East African mountain grasses.
Hereditas, Lund 1952 : **38** : 256–66.

The following somatic chromosome numbers are reported for alpine and subalpine collections obtained by the Swedish East Africa expedition in 1948: *Agrostis* spp., 28, 42; *Deschampsia* aff. *caespitosa*, 26; *D. flexuosa*, 28, 42; *Festuca* spp., 28; *Koeleria* sp., 14; *Pentaschistis* spp., 26, 52, *c.* 39–40 (triploid hybrid); and *Poa* spp., 42, except in one collection with $2n = 28$.

2751 MYERS, W. M.
Registration of varieties and strains of bluegrass (*Poa* spp.).
Agron. J. 1952 : **44** : p. 155.

Merion (cf. Absts. 434 and 1966) has been registered in the USA.

2752 HANSON, A. A., GARBER, R. J. and MYERS, W. M.
Yields of individual and combined apomictic strains of Kentucky bluegrass (*Poa pratensis* L.).
Agron. J. 1952 : **44** : 125–28.

Five strains of Kentucky bluegrass, ranging from tall coarse-leaved types with open growth habit to short fine-leaved types forming dense, turf, gave significantly higher average yields when grown in combinations of 2, 3, 4 or 5 strains than when grown separately. None of the five strains alone equalled commercial Kentucky bluegrass, but some combinations outyielded the commercial variety which is itself a mixture of types. These results conform with previous observations that single strains developed by breeders are usually outyielded by commercial Kentucky bluegrass, and indicate a possible method of improving yields.

2753 MARSH, V. L.
A taxonomic revision of the genus *Poa* of United States and Southern Canada.
Amer. Midl. Nat. 1952 : **47** : 202–50.

Hitchcock's classification (cf. *Plant Breeding Abstracts*, Vol. V, p. 375 and Vol. XXI, p. 999) is discussed and revised, particular attention being given to the importance of diecism as a basis for grouping species. The wide variation within an apomictic species, occasionally reproducing sexually, was not realized by Hitchcock; thus many of his species are now considered to be merely geographically distinct forms of a single species.

2754 GRUN, P.
Effect of environment upon chromosomal pairing of some species and hybrids of *Poa*.
Amer. J. Bot. 1952 : **39** : 318–23.

The numbers of univalents at the first meiotic

metaphase in pollen mother cells of *P. ampla*, *P. nevadensis*, *P. ampla* x *P. pratensis* and *P. ampla* x *P. compressa* have been compared in plants with tall or short culms growing in the mild Santa Clara Valley, Calif., and at 1400 and 3050 m. in the Sierra Nevada. All clones were polyploids, ranging from hexaploids with $2n = 42$ to forms with $2n = 98$. There were no significant differences in univalent frequency between material from long or short stems. Although there was no significant difference in univalent frequency between plants grown in the valley and at 1400 m., there were significantly more univalents at 3050 m. Different clones showed varied response to the high altitude; in general the largest increase in frequency of univalents occurred in those plants showing the maximum decrease in vigour.

2755 HANSON, A. A.
The inheritance of developmental stages in crosses between clones of orchard grass (*Dactylis glomerata* L.).
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 40–43.

Inheritance of the following three stages of development was analysed in crosses and back crosses involving two early clones and one late clone: (1) number of days from initiation of growth in the spring to heading; (2) number of days from heading to flowering; and (3) number of days from flowering to seed ripening. Theoretical genetical ratios approached the observed data more closely when the ratios were calculated according to the assumption that cocksfoot is an autotetraploid. The means of genetic variances estimated for the three stages suggest that both phenotypic and genic dominance tend to be intermediate. In order to account for the observed F_2 distributions for stage (1), it is however necessary to postulate a factor *C* for early heading, showing partial phenotypic dominance over genes *A* and *B* for delayed heading. Both the latter genes appeared to behave in a strictly additive way, with *A* having the greater phenotypic effect. It is thought that *B* must be present in the duplex condition in order to exert an appreciable phenotypic effect. The three periods studied are apparently conditioned by eight major genes, some of which may be involved in more than one stage. Selection for late types should be possible on the basis of heading data. For grouping selections in maturity groups so that mutual pollination in polycross nurseries is ensured, observations on flowering are however more satisfactory.

2756 GRUNDER, M. S. and DERMANIS, P.
The effect of pollinator plants on seed set in vegetatively propagated orchard grass.
Agron. J. 1952 : **44** : 275–76.

In connexion with the possibility of producing F_1 hybrid seed of cocksfoot, a study was carried out on the effect of a limited number of pollinator plants upon the seed set of a relatively self sterile strain obtained by vegetative increase of a single plant selection from an inbred strain. The pollinators were developed in a similar fashion from an unrelated inbred strain; they were planted at intervals in the same rows as the first strain. The plants nearest the pollinators had the highest number of caryopses per panicle. At distances greater than $1\frac{1}{2}$ yds. the pollinators had little effect upon seed set.

2757 CLARKE, M. F.
A study of the carotene and crude protein content of orchard grass (*Dactylis glomerata* L.).
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 32–35.

Variation in carotene and crude protein content of cocksfoot clones was analysed in relation to stage of sampling, artificial drying, prolonged storage, nitrogen supply, heritability and cutting management. Evidence of heritable variability in both carotene and crude protein content was secured. Single crosses of parental clones showed differences in combining ability for carotene content. The data obtained from these single crosses and from top crosses led to the conclusion that selection of open-pollinated plants with high carotene content would provide a satisfactory basis for developing varieties improved for this constituent.

2758 BRADSHAW, A. D.
Populations of *Agrostis tenuis* resistant to lead and zinc poisoning.
Nature, Lond. 1952 : **169** : p. 1098.

A sample of a population from a disused lead mine near Aberystwyth has shown smaller and slower growth on normal soil than a sample of *A. tenuis* from a nearby *Agrostis-Festuca* pasture. In soil from the mine the latter sample made no growth at all, whereas the former grew normally. These results were obtained immediately after the initial collection and again after the material had been in cultivation in normal soil for two years; no evidence of any change in the resistance of the mine sample was secured. Only three out of the 60 plants of the pasture sample

exhibited any real resistance to lead and zinc poisoning.

2759 DE LITARDIÈRE, R.
Observations caryosystématiques sur le *Phleum pratense* L. var. *brachystachum* Salis. (**Caryosystematic observations on *Ph. pratense* L. var. *brachystachum* Salis**).
CR Acad. Sci. Paris 1948 : **226** : 1574–75.

The above variety is diploid ($2n = 14$) and would be classed with *Ph. nodosum* by those who regard *Ph. pratense* as necessarily hexaploid. The author, however, points out that *Ph. pratense* and *Ph. nodosum* can hardly be distinguished morphologically, and he recommends that the latter species be included in the former. The tendency to erect species on the basis of chromosome number alone is criticized.

2760 DE LITARDIÈRE, R.
Sur l'existence dans les Pyrénées d'une nouvelle race chromosomique du groupe du *Phleum alpinum* L. (**On the existence in the Pyrenees of a new chromosomal race of the *Ph. alpinum* L. assemblage**).
CR Acad. Sci. Paris 1948 : **226** : 1327–29.

A plant with the morphological characters of *Ph. commutatum* and the chromosome number ($2n = 14$) of *Ph. alpinum* sens. str. has been discovered in the Marcadau valley of the Pyrenees. The author is of the opinion that *Ph. pratense*, *Ph. nodosum*, *Ph. alpinum* and *Ph. commutatum* might all, with advantage, be included in one collective species, *Ph. pratense*. The newly described form is named var. *Ayliesianum* of the subspecies *alpinum* of the above collective species.

2761 DE LITARDIÈRE, R.
Nouvelles observations sur les *Phleum pratense* L. subsp. *alpinum* (L.) Asch. et Graebn, des Pyrénées. [**New observations on the Pyrenean forms of *Ph. pratense* L. subsp. *alpinum* (L.) Asch. et Graebn**].
CR Acad. Sci. Paris 1949 : **228** : 349–51.

The distinction drawn by some taxonomists between *Ph. alpinum* and *Ph. commutatum* is criticized as unreal. The author describes a stand on the Col du Puymorens with the morphological characters of *Ph. commutatum*, but having in some cases $2n = 28$ chromosomes and in others $2n = 14$. The diploid ($2n = 14$) was more vigorous than the tetraploid.

2762 HAWK, V. B. and WILSIE, C. P.
Parent-progeny yield relationships in bromegrass, *Bromus inermis* Leyss.
Agron. J. 1952 : **44** : 112–18.

Some 78 progenies resulting from open pollination of the S_0, S_1 and S_2 generations of 26 selections comprising naturalized strains from Kansas, Missouri, Washington, Saskatchewan and the USSR were grown for three years in replicated trials at the Iowa Agricultural Experiment Station. Marked differences were observed in the yields of open-pollinated progenies over the three years but positive correlations were obtained for the yield relationship between parent clones and their progenies resulting from open pollination. Seedling vigour differed among strains and was correlated with forage yield at maturity, indicating the possibility of evaluating selections in the seedling stage. The effect of inbreeding was seen in the lowered yields of the S_1 and S_2, but their open-pollinated progenies gave yields substantially similar to those of noninbred lines. It is assumed that the polyploid nature of *B. inermis* retards the approach towards homozygosity; thus lines capable of giving high yields may still be selected after one or more generations of inbreeding.

2763 DE CUGNAC, A.
Un type singulier de comportement héréditaire chez une Graminée: *Bromus macrantherus* Hack., "mutation fugace" et "espèce statistique". (**An unusual type of hereditary behaviour in a Graminaceous species, *B. macrantherus* Hack., "transitory mutation" and "statistical species"**).
CR Acad. Sci. Paris 1947 : **224** : 149–51.

On sowing a mixed population of the 2-staminate, cleistogamous species *B. rigidus* and the 3-staminate, chasmogamous species *B. macrantherus* from La Baule, Loire-Inférieure, the author found that the progeny consisted entirely of plants with the characteristics of *B. rigidus*. It is therefore concluded that *B. macrantherus* is a transitory mutation of *B. rigidus* and that its maintenance in the wild state depends on the reiterated appearance of this transitory mutation. A species existing in a state of equilibrium brought about by balanced mutation and back mutation is termed a statistical species.

2764 JULÉN, G.
Svalöfs original Prior foderlosta. (**The Svalöf brome grass Prior**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 16–17.

This, the first Swedish bred variety of brome grass, will be put on the market in spring 1952. Selection in brome grass that had been grown for many years at Tornby, Östergötland, had revealed considerable variation and, on purifying some of the more productive types, Prior was isolated. It has surpassed the ordinary commercial Tornby brome grass in yield of green matter by 3%. A variety of some uniformity has been produced and the grower can now obtain a variety of known characteristics.

2765 SCHREIBER, J.
A schedule for the study of somatic chromosomes in *Bromus*.
Stain Tech. 1951 : **26** : 247–50.

Tillers are excised very close to their point of emergence from the base of the plant, and grown in vermiculite to which a complete mineral nutrient solution is added periodically. While intact, the roots are treated with 0·0015 M 8-hydroxyquinoline for 4 hours at 18° C. They are next excised and placed in 45% acetic acid for about 5 minutes. The tips are stained in Feulgen; temporary squash preparations are then made.

2766 CARTER, J. F. and DICKSON, J. G.
The influence of environment on the development of two foliar diseases of *Bromus inermis* Leyss.
Agron. J. 1952 : **44** : 119–25.

Significant differences were observed in the reaction of 40 clonal lines, grown at Madison, Wis., to bacterial blight (*Pseudomonas coronafaciens* var. *atropurpurea*) and brown leaf spot (*Pyrenophora Bromi*). Variations in the severity of symptoms within resistant and susceptible lines occurred with seasonal changes, but neither spacing nor nitrogen supply exerted appreciable influence on disease reaction.
Under greenhouse conditions 4 resistant and 4 susceptible lines inoculated with either *Ps. coronafaciens* var. *atropurpurea* or *P. Bromi* maintained their relative reactions at 16, 20, 24 and 28° C. The most susceptible line, S–1, was severely damaged at all temperatures; the injury sustained by other susceptible varieties increased with rising temperatures and the expression of resistance in field resistant lines diminished.

2767 REBISCHUNG, J.
Étude de populations de ray-grass et du mode de transmission de deux caractères dans le genre *Lolium*. (**A study of rye grass populations and of the mode of inheritance of two characters in the genus *Lolium***).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : 497–547.

Rye grass breeding at the Station centrale d'Amélioration des Plantes, France, has included analyses of natural populations and of distinctive characters of *L. perenne*, *L. italicum* and *L. multiflorum*, the samples having been drawn from various regions in Normandy. Differences were found in resistance to winter injury, and the percentage of plants heading in the first year of sowing was higher in samples from a district where the grass was cut for hay.
Other research is in progress on self fertility and interfertility, inbreeding and character analyses.
Loss of vigour was common in inbred lines.
It is suggested that, in general, morphological and physiological characters used to distinguish *Lolium* species are only loosely correlated and that the breeding of perennial types with, in addition, characters found in the annual or biennial forms should be possible.
Analyses showed that: the character folded leaf, which was dominant to rolled leaf, was conditioned by 3 gene pairs, P_1p_1, P_2p_2, and P_3p_3, P_1 being epistatic to P_2, and P_2 to P_3; and absence of auricles, which is dominant to their presence, is determined by 3 gene pairs O_1o_1, O_2o_2 and O_3o_3, O_1 being epistatic to O_2, and O_2 to O_3. Linkage was found between the corresponding genes of the *P* and *O* series.
In the author's view, the two botanically recognized groups (1) *L. perenne* and (2) *L. multiflorum* and *L. italicum*, should not be regarded as comprising different species, but merely as extreme forms within the genus.

2768 SAURA, F.
Comportamiento cariológico de *Lolium perenne* Linn., *Lolium multiflorum* Lam. y de su F_1. (**Caryological behaviour of *L. perenne* Linn., *L. multiflorum* Lam. and their F_1.**)
Rev. Fac. Agron. B. Aires 1951 : **13** : No. 1 : 91–107.

Data are given on such features as number of chiasmata, coefficient of terminalization, precocious separation of bivalents, lagging chromatids and bivalents, bridge formation and

occurrence of micronuclei in a number of representatives of the two species and in reciprocal hybrids between them. In all plants $n = 7$ and $2n = 14$; those of *L. perenne* and the hybrids all displayed reduced fertility associated with the lagging of one pair of chromosomes at anaphase and the consequent formation of micronuclei. There was no marked difference between the hybrids and *L. perenne*. *L. multiflorum* was more normal in behaviour.

2769 Wright, L. N.
Variations in seed-set, pollen quality, yield, and frequency of microsporocyte quartets showing micronuclei among plants of red fescue, *Festuca rubra* L. vars. *genuina* Hack. and *fallax* Hack.
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 63–68.

Seed production was investigated in 22 clones of chewings fescue (*F. rubra* var. *fallax*) and 29 clones of creeping red fescue (*F. rubra* var. *genuina*). The clones differed significantly in open-pollinated and selfed seed set, total seed yield and percentage of imperfect pollen. Seasonal variation occurred in open-pollinated and selfed seed set and in percentage of imperfect pollen. Variation in selfed seed set did not account for the differences in total seed yield. Some relationship was found between open-pollinated seed set and total seed production. High self-compatibility tended to be associated with high cross-compatibility. Percentage of imperfect pollen did not account for all the variation in open-pollinated seed set. Every clone studied had the expected chromosome number of $2n = 42$. Meiotic irregularities, measured as the frequency of quartets with micronuclei, did not account for all the differences in percentage of imperfect pollen. The frequency of microspores with micronuclei failed to show a significant relationship with seed set.

2770 Camp, W. H.
'Mandan rice-grass' and a nomenclatural problem.
Amer. J. Bot. 1952 : **39** : 349–51.

The problem of adequate taxonomic treatment of the new Mandan rice grass, a fertile amphidiploid race derived from the sterile hybrid *Stiporyzopsis caduca* (cf. Abst. 2771), is discussed with reference to recommendations made in the International Code of Botanical Nomenclature.

2771 Nielsen, E. L. and Rogler, G. A.
An amphidiploid of x *Stiporyzopsis*.
Amer. J. Bot. 1952 : **39** : 343–48.

At the Mandan breeding nurseries, N. Dak., a single seedling was obtained in 1945 from the intergeneric hybrid designated x *Stiporyzopsis caduca*, previously supposed to be sterile. The seedling proved to be a fertile amphidiploid with regular meioses in which 65 bivalents were formed. Selections from the amphidiploid have shown uniformity both within and between lines; no obvious morphological deviations have been apparent from the F_2 to the F_5. Since 1945 several more seedlings identical with the original fertile seedling have arisen from the same supposedly sterile plant. The amphidiploid is more robust than either its hybrid parent or *Stipa viridula* ($2n = 82$) and *Oryzopsis hymenoides* ($2n = 48$), the putative parents of the sterile intergeneric hybrid; with respect to growth habit and many morphological characteristics, the amphidiploid is intermediate between these putative ancestors. The absence of adequate taxonomic criteria for naming the amphidiploid is discussed. Mandan rice grass has been proposed as a vernacular term for the new plant which promises to be a valuable forage grass for certain areas.

2772 Forbes, I. (Jun.).
Chromosome numbers and hybrids in *Zoysia*.
Agron. J. 1952 : **44** : 194–99.

The breeding behaviour and cytology of strains of *Z. japonica* from Manchuria, Korea and Japan, *Z. matrella* from the Philippines and *Z. tenuifolia* from Guam have been investigated at the University of Maryland. All three species proved to be short day plants requiring temperatures above 85° F for flower production; clones of *Z. tenuifolia* flowered later than the other species unless they were kept at a higher temperature. Differences between species in respect of anthocyanin formation, number of caryopses per spike and width and shape of leaves were used to identify hybrids. Self pollination was prevented in all cases by pronounced protogyny; interspecific hybridization occurred freely in all possible combinations, indicating a high degree of cross compatibility between the species. Regular meioses were observed and gametes with 20 chromosomes were produced by all species. It is therefore obvious that in nature only geographical and physiological barriers isolate these species, preserving their genetical individuality. Although cross pollination is favoured, the perennial and stoloniferous habit of these turf-forming grasses restricts survival of seedlings and thus minimizes opportunities for chromosome changes.

The relative ease with which hybrids are produced indicates that superior turf varieties may be obtained by a breeding programme involving all available specimens.

2773 DAVIDSON, J. F. and ROMBERG, P. F.
Genetic variation in *Andropogon*.
Madroño 1952 : **11** : 203–06.

Wide variation in morphological characteristics is reported from a systematic sampling of the Nebraska populations of *A. Gerardi*, *A. Hallii* and *A. scoparius*.

2774 OKE, J. G.
Chromosome numbers in some species of *Dichanthium* Willemet, and *Bothriochloa* O. Ktze.
Proc. Indian Acad. Sci. 1950 : **32** : Sect. B : 227–30.

The following chromosome numbers have been determined at the Poona College of Agriculture: *D. annulatum*, $2n = 40$; *D. caricosum*, $2n = 40$; *D. nodosum*, $2n = 40$; and *B. intermedia*, $2n = 40$ and 60.

2775 ELJČANINOVA, N. N.
(New varieties of annual grasses at the Kineljskaja State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 49–50. [Russian].

A new variety of Sudan grass, Kineljskaja 90, and a new variety of sorghum, Kineljskoe 2, were bred at the institute. Kineljskaja 90 was selected from material originating from the Krasnyĭ Kut Breeding Station. It yields 35–40 c. hay and 10–13·2 c. seed per ha. and is early and tolerant of low temperatures and shows resistance to drought. Kineljskoe 2, obtained by mass selection, produces 250–300 c. green matter and 18–20 c. seed per ha. It is a mid-season variety showing resistance to drought and has a high sugar content.

2776 DE LITARDIÈRE, R.
Sur deux Graminées (Avénées-Airopsidées) à nombre chromosomique de base égal à 4: les *Airopsis tenella* (Cav.) Coss. et DR. et *Periballia laevis* (Brot.) Asch. et Graebn. [**On two Gramineae species belonging to the Aveneae-Airopsideae with a basic chromosome number of 4: *A. tenella* (Cav.) Coss. et DR. and *P. laevis* (Brot.) Asch. et Graebn**].
CR Acad. Sci. Paris 1948 : **227** : 1071–72.

A chromosome number of $2n = 8$, hitherto unknown in the Gramineae, is reported for the above two species.

2777 DE LITARDIÈRE, R.
Nombres chromosomiques dans le genre *Holcus* L. (**Chromosome numbers in the genus *Holcus* L.**).
CR Acad. Sci. Paris 1949 : **228** : 1786–87.

The following chromosome counts are reported: *H. Gayanus*, $2n = 8$, *H. mollis*, $2n = 28$ and *H. lanatus*, $2n = 14$.

2778 DE LITARDIÈRE, R.
Sur la présence de micronoyaux dans le méristème radiculaire d'*Elymus* asiatiques. (**On the presence of micronuclei in the root meristem of some Asiatic species of *Elymus***).
CR Acad. Sci. Paris 1947 : **255** : 981–83.

One or two micronuclei, with complete chromosome sets and nucleoli, were observed to occur regularly in addition to the normal nucleus in the root meristems of *E. angustus*, *E. akmolinensis* and *E. junceus*.

2779 KOSAREV, M. G.
(The populations of *Agropyron*).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 12 : 14–17. [Russian].

Observations at the Kamyšino State Breeding Station have shown that the composition of *Agropyron* populations changes as a result of their continued cultivation on some types of soil. A local population Kamyšinskaja [Kamyšino] has been improved by cultivation upon rich soil, hybridization and mass selection. The improved variety has an appreciably higher percentage of narrow-eared awned forms.

LEGUMINOUS FORAGE PLANTS

2780 CARNAHAN, H. L. and FORTMANN, H. R.
Performance of varieties of grass and legume species in Pennsylvania in 1950 and 1951.
Progr. Rep. Pa Agric. Exp. Sta. 1952 : No. 71 : Pp. 12.

The results of variety tests of meadow fescue, brome grass, cocksfoot, tall oatgrass, reed canarygrass, timothy, perennial ryegrass, lucerne, red clover and birdsfoot trefoil are summarized.

2781 SCHOTH, H. A., GENTNER, L. G. and WHITE, H. H.
Talent alfalfa.
Sta. Bull. Ore. Agric. Exp. Sta. 1952 : No. 511 : Pp. 8.

The lucerne Talent is described in detail (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1705).

Another important advantage of the variety, in addition to those already referred to, is a high degree of resistance to stem nematode; crown wart and stem rot cause little loss. Talent is however susceptible to bacterial wilt. Other possible factors influencing its cultivation are discussed.

2782 Zimmermann, K.
Vier Jahre Arbeiten an Luzerne in Müncheberg 1948–1952. (**Four years' work with lucerne in Müncheberg, 1948-1952**).
Züchter 1952 : **22** : 106–18.

In 1948 some 58 selections were made from 4200 single plants of *Medicago media*, the criterion being a combination of good vigour, leafiness, size of plant and internode length with the capacity to produce at least 10 grm. of seed. The progenies varied between 0·0 and 36·4 grm. in seed yield, and in yield of green matter were not inferior to Thüringer lucerne. The best 100 plants in respect of seed production were selected in 1949; their progenies showed a correlation of ± 0·35 [sic] between seed yield of parent and offspring. The yields of green matter were in almost all selections also higher than those of the varieties used as controls. The two most promising had an average superiority of 15% in green matter and 25% in seed yield. In future, selection work will be undertaken with much larger numbers of initial plants.
Out of 405 plants selfed in 1949 only 228 set seed, even when artificially tripped; of these, 50 plants with at least 20 seed each were selected and selfed again in 1950. The self fertility and other characters varied widely, and vigour was reduced, indicating that this lucerne is predominantly cross-pollinated. In 1951 there were also wide differences in the fertility of the selfed progenies but some plants bore several hundred seeds. Crosses are to be made between the inbred lines in the hope of increasing seed yield.
Very little difference was observed in the yield of green matter between different lucerne strains tested; this is ascribed to the high conditions of fertility under which they were tested.
A number of twin plants have been examined but no haploids have been found so far. Colchicine treatment has been applied for the production of polyploids and X rays for the production of mutations.
Practical questions concerned with seed production are also under investigation.

2783 Čudars, M.
Pēterlauku Izmēģinājumu Stacijas pētniecības darbi. (**The research work at the Pēterlauku Testing Station**).
Latv. PSR Zinātņu Akad. Vēstis 1951 : No. 1 (42) : 71–79. [Latvian].

A productive lucerne variety Pēterlauku 2, a promising blue hybrid lucerne, Pēterlauku 967, and a yellow hybrid lucerne, Pēterlauku, have been developed.
A new early red clover variety Pēterlauku 1 has been obtained by mass selection and open intervarietal hybridization of local material. Breeding work with several promising red clovers is in progress.

2784 Pini, P. L.
L'importanza del miglioramento genetico dell'erba medica nell'ambiente maremmano. (**The importance of the genetic improvement of lucerne in the Maremma district**).
Agricoltura Tosc. 1952 : **7** : 105–08.

In order to obtain a lucerne adapted to the arid and unfavourable climate and soil conditions of the Maremma district in Italy, the Agronomic Institute of Florence and the Tuscany Seed Corporation on the Grancio Ricasoli Estate have adopted a long-term programme of breeding and selection for longevity, resistance to drought, renewal of growth at the time of the first rains in autumn and mutually well-adapted rates of leaf and stem development. In the meantime, selection of suitable local biotypes is being used in the formation of improved mixed populations. Three such populations have been in cultivation for three years with promising results. They are being compared *inter se* and with local seed.

2785 Bingefors, S.
Polyploidiförädlingens betydelse för vallodlingen. (**The importance of polyploid breeding for grassland cultivation**).
Svenska MosskFören. Tidskr. 1951 : **3** : 53–56.

The advances made by Swedish plant breeders in research on the production of useful polyploid forms of alsike and red clover are discussed. Work on timothy and white clover still presents difficulties.
Examples are cited of the superiority of some polyploids of alsike and red clover over the diploids. Yield, disease and nematode resistance, and fodder value are among the characteristics compared in the tetraploid and diploid forms. At Weibullsholm, in three trials the tetraploid alsike strain Tetra showed an excess

yield of green forage of 7–31% over the diploid, while in second-year leys in two experiments the excess was 18 and 17%. A yield increase of 10–20% is also reported from Svalöf in first-year ley, as well as an improvement in persistence, so that as a result of chromosome doubling the second-year ley, usually poor with alsike, should give a satisfactory yield. This should considerably extend the agricultural utility of alsike.

From various Swedish research institutes come similar reports of increased yields from tetraploid red clovers, compared with their diploid counterparts (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2743 and Vol. XXII, Absts. 465 and 468). A tetraploid cross between Merkur and Wambåsa proved more susceptible to drought than diploid Merkur, but tetraploid lines vary greatly in this respect.

Tetraploid red clover has in many cases surpassed the diploids in rate and quality of aftergrowth, an important point where the crop is for ensilage.

At first it seemed that chromosome doubling was accompanied by increased susceptibility to parasites, but at Svalöf a tetraploid line, highly resistant to nematode and to rot, has been found, while at the Ultuna Station a tetraploid line from the variety Ultuna has yielded three times more than the mother strain in nematode infected soil.

The range of variation in resistance is wider in the tetraploids than the diploids and it should be possible to breed fully resistant tetraploid strains; and similar possibilities may exist in regard to winter hardiness and persistence in red clover.

Quality tests showed that the tetraploids have a higher protein and lower cellulose content than the diploids.

Seed production problems and the value of the new tetraploids for Swedish agriculture are considered.

2786 Åkerberg, E. and Lesins, K.
Herbage production of grown alfalfa plants in relation to their length and weight at the seedling stage.
Acta Agric. Scand. 1952 : **2** : 153–57.

In experiments at the Ultuna Substation of the Swedish Seed Association the average length and dry weight of lucerne seedlings closely agreed with the average herbage yields of the adult plants, in both inbred and hybrid material. Further work is required to study the value of the seedling test as a basis of selection, since different growing conditions and plants of widely different origins may not provide consistent results.

2787 Armstrong, J. M.
Self-sterility studies in alfalfa.
Sci. Agric. 1952 : **32** : 153–62.

A study of self sterility in lucerne has been made at the Central Experimental Farm, Ottawa, in connexion with the development of F_1 hybrids. Among selections of Ladak, three types of self sterility have been distinguished, due to (1) meiotic irregularity, (2) a high percentage of poor pollen resulting from faulty maturation and (3) self incompatibility in plants producing a high percentage of good pollen. In planning crosses for producing single and double hybrids, two superior plants with the second type and another two with the third type of self sterility should be chosen. The F_1 single crosses should be effected between plants possessing the same type of self sterility, so that this character is retained and crossing between related F_1 plants is reduced to a minimum. In this way the double cross seed would be almost entirely the result of outcrossing.

2788 Moe, G. G.
Rizoma, la nueva variedad de alfalfa.
(Rhizoma, the new lucerne variety).
Agricultura Trop., Bogotá 1952 : **8** : No. 1 : 11–14.

A description in Spanish is given of the new lucerne variety (cf. Abst. 1987).

2789 Larkin, R. A.
Wildbee population cycles and the production of alfalfa seed.
Agron. J. 1952 : **44** : 216–18.

An investigation of the pollinating activities of various wild bees, with respect to the percentage seed set of lucerne, was carried out at Lincoln, Neb., during 1948 and 1949. Seed yields were largest in stands whose time of flowering coincided with the maximium bee population. It is suggested that if seasonal fluctuations in the distribution of wild bees can be predicted it may be possible to select strains of lucerne which flower when bees are abundant.

2790 **1951 Report of the Uniform Alfalfa Nurseries.**
US Dep. Agric., Agric. Res. Admin., Bur. Pl. Indust. Soils Agric. Engin. Beltsville, Md. 1951 : Pp. 191.

A report, mostly in the form of tables, is given of the performance of polycross, synthetic and other strains in the uniform tests of lucerne carried out during 1951 in the United States and Canada.

2791 Hanson, A. A. and Hanson, R. G.
Abnormal petiole and petiolule development in red clover, *Trifolium pratense* L.
J. Hered. 1952 : **43** : 58–60.

Data have been obtained suggesting that absence or almost complete absence of petioles and greatly elongated petiolule are conditioned by complementary gene pairs designated *aa* and *bb*, and one or more modifiers.

2792 Sokoljskaja, B. P.
(Early attestation of red clover).
Agrobiologija (Agrobiology) 1952 : No. 2 : 117–19. [Russian].

A method of determining the degree of earliness of clover has been developed at the Agricultural Research Station of the Ivanovskaja province. It consists in examining the material, which comprised a mixed local population of early and late forms and the first, second and third generations of natural hybrids between them, after the second internodes have developed. In the early forms, the inflorescence primordia were more conspicuous than in late forms.

2793 Hanson, R. G.
Isolation and study of inheritance of resistance of red clover to *Sclerotinia* crown rot.
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 44–48.

The grain inoculum technique was effective for the production of epiphytotic conditions under which selection for resistance to *Sclerotinia Trifoliorum* could be carried out. Field inoculations are considered to be more satisfactory than greenhouse tests, because of the variability of the latter. A highly significant correlation (+ ·566) was obtained between the results of greenhouse and field tests. In trials under both conditions, the highest degree of resistance was exhibited by Offer, Ultuna and other strains from Sweden, the Finnish variety Tammisto and the American varieties Kenland, Midland and Cumberland. Data on parental clones and their F_1 progenies indicated that reaction to *S. Trifoliorum* is heritable.

2794 Knight, W. E.
Breeding Ladino clover for persistence and longevity.
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 49–51.

Clones of Ladino were isolated which transmitted good persistence as well as yielding ability to their progenies. Selection should be based on at least two years' performance in the field. Clones exhibiting the greatest amount of persistence were small to intermediate in size; large clones with fairly good persistence were however found. The polycross method was suitable for isolating clones with high general combining ability. In greenhouse studies, the following characters were significantly correlated with winter survival in the field: total number of stolons (+ ·736); stolon diameter score (— ·519); vigour in the greenhouse after flowering (+ ·414); lateness of flowering (+ ·321); and disease score for one year of the experiments (+ ·733). Persistent clones and progenies produced large numbers of stolons having relatively small diameters. A multiple correlation of + ·789 was obtained for winter survival, stolon diameter, lateness of flowering, vigour after flowering and total number of stolons. Significant associations between rooting and winter survival were not detected. Covariance analysis suggested that although observable disease had a marked effect upon persistency other factors were more important.

2795 Flanagan, T. R.
Cold resistance of Ladino clover and its measurement.
Abstr. Doct. Diss. Pa. Univ. 1951 (1952) : **14** : 36–39.

Freezing stolons at — 10° C for 10 hours, followed by exosmosis in distilled water at 2° C for 24 hours, provided a satisfactory basis for a standard procedure of testing the cold resistance of clones. Conductivity measurements of the exosmosed solutions were closely correlated with chloride and potassium ion concentrations. Recovery ratings were inversely correlated with conductance values. Clonal differences in cold resistance were not significant but some clones were consistently more resistant than others. Cold resistance varied seasonally, being greater in late winter, and lower in early autumn and early spring. Both temperature and day length affected the induction and loss of cold resistance.

2796 Kiffmann, R.
Morphologie und Systematik der landwirtschaftlich bedeutsamen Wicken- (*Vícia-*) und Linsen- (*Léns-*) Arten. [**Morphology and systematics of the agriculturally important vetch (*Vícia*) and lentil (*Léns*) species**].
Z. Acker- u. Pflanzenbau 1952 : **94** : 422–79.

A full botanical description is given of the species concerned, taking into account also

important agricultural varieties, the characteristics of which are indicated.

2797 Decker, P., Wallace, A. T. and Webb, T. E.
Recent studies on lupines in Florida.
Phytopathology 1952 : **42** : p. 283. (Abst.).

Blue and yellow lupin breeding in Florida is briefly described. Hybridization between commercial strains and native or introduced species was initiated in 1949 to develop vigorous sweet lupins resistant to disease and insect pests. X ray treatment of seeds has produced mutants which may be of agronomic value.

2798 Tedin, O. and Hagberg, A.
Studies on X ray induced mutations in *Lupinus luteus* L.
Hereditas, Lund 1952 : **38** : 267–96.

The results of ten years' work carried out by the Swedish Seed Association on X ray induced mutations, chiefly in the sweet yellow lupin, are reported, emphasis being laid on results of theoretical importance. Doses of 12500–17500 r. have proved the most satisfactory. The bitter forms of both yellow and blue lupin have shown less sensitivity to the lethal effect of X rays than the sweet types. The fertility of the X_1 is lower than that of the controls. The X_2 and X_3 contain large numbers of partially sterile plants but their number gradually decreases in later generations. Detailed studies have been carried out on the fertility of the X_5 and X_6 of the mutant strains termed anthocyanin$_1$ and reduced petals, both monofactorial recessives. In the former, a general reduction in fertility was recorded, equal in homozygous normals, heterozygotes and homozygous recessives. In the ground, homozygous or heterozygous normal segregates showed no reduction in fertility, but the homozygous recessives were completely sterile. The most frequent type of mutant character was reduction in chlorophyll content; the second most frequent was increased anthocyanin content. Early ripening mutants of possible economic value have been secured. Cases of mutation occurring in X_1 plants were observed. In one X_1 plant three mutations in different but linked loci occurred; the loci concerned were *chl* (*chlorina*), *bbr* (no basal branches) and *st* (sterility). Environmental conditions could greatly modify most of the mutants. In two mutant strains homozygous and heterozygous normals were compared with regard to number of pods on the main axis and percentage of ovules giving ripe seeds; no evidence of monohybrid heterosis was secured.

2799 Fesenko, N. V.
(Vegetative hybridization of the lupin).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 12 : 28–33. [Russian].

Grafting experiments with lupins at the Leningrad Agricultural Institute are described. The grafts of *Lupinus venustus* on *L. angustifolius* vars. *coeruleus* and *roseus* and of *L. angustifolius* vars. *roseus* and *coeruleus* on yellow lupin proved 91·6% compatible under field conditions. The grafted plants differed from the controls in their output of green matter, 1000 seed weight, alkaloid content and seed colour. Improvements in 1000 seed weights of some plants have been obtained without undue increases in the alkaloid content.

2800 Alekseenko, A. I.
(The vitality of pollen and stigma of the lupin).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 54–58. [Russian].

Experiments at Harjkov showed that the pollen of the white lupin had good viability on the first or second day after the flowers burst open, while the viable pollen of the blue and yellow lupins was obtained at an earlier stage. The flowers of the white, blue and yellow lupins which bear stigmas receptive to foreign pollen after emasculation are described.

2801 **Showing the way in agricultural problems and possibilities.**
Fmg. S. Afr. 1952 : **27** : 233, 245.

An account of forage lupins grown in the western Cape Province, South Africa, provides information on improved strains produced by breeding and selection during the past 20 years. Many popular strains have low alkaloid content, flower simultaneously and produce seed pods that resist shattering and contain soft-coated seeds which germinate readily. Development of strains with improved disease resistance is in progress at the Stellenbosch-Elsenburg College of Agriculture.

2802 Guinochet, M.
Recherches de taxonomie expérimentale sur la flore des Alpes et de la région méditerranéenne occidentale. III. Notes caryosystématiques sur le *Lotus corniculatus* L. sens. lat. (**Experimental taxonomic studies on the flora of the Alps and of the west Mediterranean region. III. Caryosystematic notes on *L. corniculatus* L. sens. lat.**).
Rev. Cytol. Cytophysiol. Vég. 1945 : **8** : 87–95.

Subspp. *uliginosus* and *tenuifolius* of *L. corniculatus* have $2n = 12$ chromosomes in contrast to the $2n = 24$ chromosomes of subspp. *decumbens* and *eu-corniculatus*. Var. *tenuifolius* is believed to be ancestral to var. *eu-corniculatus* which is more vigorous and has largely replaced the diploid subspecies.

ROOTS AND TUBERS

2803 Kolbe, F. and de Vos, W. H.
The Japanese radish.
Fmg. S. Afr. 1952 : **27** : 235–38.

This subspecies of *Raphanus sativus*, introduced privately to the Heidelberg district of the Transvaal from Asia, is recommended as a winter fodder crop for other parts of South Africa. Natural hybridization with wild cruciferous plants has already occurred in many areas, indicating the necessity for careful seed selection.

2804 Heinisch, O., Klauss, M. L. and Darmer, G.
Entwicklung und Bau des Rübenknäuels im Hinblick auf seine Zertrümmerungsfähigkeit und die Bedeutung des Zuchtzieles "Einzelfrüchtigkeit." (**Development and structure of the seed cluster of beet with reference to its segmentation capacity and the importance of the "monogerm condition" as an aim in breeding**).
Züchter 1952 : **22** : 79–84.

An anatomical and histological study was made of the seed cluster in sugar and fodder beet, to find out whether the damage caused by present mechanical methods of segmentation in the production of monogerm seed could not be localized to cause less injury to the actual seeds. Results were negative and the breeding of beets with single germ seed is advocated. The possibility of parallel variation in *Beta* spp. with regard to the monogerm character should be considered.

2805 Hijner, J. A.
De gevoeligheid van wilde bieten voor het bietencystenaaltje (*Heterodera Schachtii*). [**The susceptibility of wild beets to the beet nematode (*H. schachtii*)**].
Meded. Inst. Rationele Suikerproduct. 1951 : No. 1 : Pp. 1–13.

Examination of *Beta lomatogena*, *B. trigyna*, *B. maritima* (from the Mediterranean coast), *B. maritima* (from the Atlantic area), *B. macrocarpa*, *B. atriplicifolia*, *B. procumbens*, *B. Webbiana* and *B. patellaris* showed that all except the last three were susceptible to *H. schachtii*. The root excretions from the three immune species proved to have as stimulating an effect on the hatching of larvae from the cysts as the excretions from sugar beets. *B. patellaris* sown in early May in a highly infested field resulted in a reduction after 5 months of about 90% in the number of live larvae present in the cysts.

2806 **Report of the Department of Agriculture for Scotland for 1951** (1952) : 37–41.

It is mentioned that potato seedling 1253a(12), raised by the Scottish Society for Research in Plant Breeding, is to be registered as a new variety under the name Pentland Ace.

2807 Rudorf, W. and Ross, H.
Grundlagen der Kartoffelzüchtung. (**Bases of potato breediug**).
Züchter 1952 : **22** : 119–27.

The importance of a knowledge of the genetical constitution of parents as revealed by selfing is emphasized and the view is expressed that it should be possible, with this knowledge, to breed heterotic hybrids by crossing inbred potato lines, as in maize, particularly in respect of polygenically conditioned characters. Yield increases might be achieved if lines arising from varieties from other countries were used as parents, since the present German varieties are genetically all closely related.
A suggestion for maintaining the resistance of new blight-resistant varieties is to keep clones of them away from other species and hybrids, which might act as bridging hosts in the development of new biotypes. The results of Black (cf. Abst. 2039) and others on breeding for resistance to blight biotypes are discussed; the type of resistance conditioned by incubation time, which is valid for all biotypes (cf. Abst. 517) is thought to be possibly more promising.

Varieties possessing this resistance, such as Ackersegen bred in 1929, still retain it undiminished.
Recent literature concerned with breeding for resistance to virus and other diseases and pests, particularly by the use of South American material, is summarized, reference being made also to certain unpublished information on leaf-roll resistance in *Solanum andigenum*, *S. chacoense* and *S. acaule*, immunity to virus X in *S. sucrense*, to Y in *S. etuberosum*, to eelworm in another species of the *S. Ballsii* group and to *Alternaria* in *S. chacoense* and related species; immunity to virus X is present in breeding material which will soon replace the top necrotic type of resistance of the Scottish varieties; clones possessing immunity to virus Y and high resistance to virus A are also available.

2808 HAWKES, J. G.
Cinco conferencias sobre el mejoramiento de la papa. **(Five lectures on potato breeding).**
Bol. Tec. Inst. Nac. Agric., Venezuela 1951 : No. 1 : Pp. 53.

The first lecture is devoted to the history of the potato in S. America before the conquest and of its introduction into Europe, the second to the species of the section *Tuberarium* and their evolution, a monophyletic origin for the domestic potato being propounded in opposition to the Russian view. The next two lectures give an account of the programme of potato breeding in Colombia, formulated by the author, which includes a full study of the local potatoes, cultivated and wild, and of their pests and diseases; the construction of a new potato research station where resistance to *Phytophthora infestans* and frost, early maturity and tuber quality are among the characters aimed at; and as a more distant goal, resistance to heat and drought, possibly using the native species *Solanum Rybinii*. Various cultural experiments have been carried out, together with investigations which indicate the Colombian biotype of *Phytophthora infestans* to be the common race A; the main virus diseases of the potato are present but cause less damage than in Europe and the USA. In lecture 5 some remarks are given concerning potato breeding in Venezuela, with suggestions for suitable sites for a potato research station, for staffing it and for the main lines of activity.
It is suggested that bolters of European varieties, being adapted to short days, should form useful breeding material for the countries of the Andes.

2809 HAWKES, J. G.
Organización y planeamiento para el mejoramiento de la papa. **(Organization and planning for potato breeding).**
Agricultura Trop., Bogotá 1951 : **7** : No. 5 : 7–11; No. 6 : 11–16; No. 7 : 11–18; No. 8 : 13–20; No. 9 : 11–19 : No. 10 : 11–14.

A comprehensive review is given of the work so far done in Colombia on potato breeding, and on projects recommended for the future. Data are provided on local varieties of *Solanum tuberosum* and *S. Rybinii*, and on Colombian wild species. Sources of resistance to the principal potato diseases are indicated. Some progress has been made in utilizing hybrids between *S. tuberosum* and *S. demissum* in breeding for late blight resistance. So far, the only race of blight encountered in Colombia seems to resemble race A. Work is also reported on resistance to virus diseases, frost resistance, adaptation to warm environments, earliness, tuber quality and bolters. Descriptions are given of the hybrids recently made.

2810 HOWARD, H. W. and SWAMINATHAN, M. S.
Species differentiation in the section *Tuberarium* of *Solanum* with particular reference to the use of interspecific hybridization in breeding.
Euphytica, Wageningen 1952 : **1** : 20–28.

Unpublished observations and literature on the cytology of interspecific hybrids of *Solanum* are discussed with special reference to the possible existence of cryptic structural differences between the genomes of the different species. In the case of the diploid species ($2n = 24$), comparative study of meiosis in amphidiploids and autotetraploids is likely to provide the best evidence of any small structural differentiation. Observations have been recorded which suggest that the chromosomes of *S. chacoense* and *S. Rybinii* are structurally distinct. In cases where interspecific structural differentiation is less distinct, e.g. between *S. Parodii* and *S. saltense* or between *S. Yabari* and *S. stenotomum*, the amphidiploids and autotetraploids show similar quadrivalent frequencies. The problem is more complex in tetraploid and hexaploid species. Studies of meiosis in F_1 *S. demissum* x *S. tuberosum*, F_1 *S. demissum* x *S. Rybinii* and [F_1 *S. demissum* x *S. Rybinii*) x *S. tuberosum*] suggest that the single genome of *S. Rybinii*, the two genomes of *S. tuberosum* and the three genomes of *S. demissum* are sufficiently similar for their chromosomes to form bivalents. From the results of multiple

crosses it appears that difficulty in direct hybridization with *S. tuberosum* is due to causes other than marked dissimilarities between the genomes, as for example between *S. acaule* and *S. tuberosum*. The significance of pairing behaviour in interspecific crosses with respect to breeding work is discussed. The view is expressed that breeding at the tetraploid level has advantages over use of pentaploid back crosses (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1946).

2811 FEISTRITZER, W.
Die Selbstungsanalyse, eine Voraussetzung für die Kreuzungszucht der Kartoffel. (The analysis of selfing results, a prerequisite for potato breeding by hybridization).
Z. Pflanzenz. 1952 : **31** : 173–95.

The selfed progenies of a number of German potato varieties were examined for skin and flesh colour, tuber shape and eye conformation, and revealed a very strong similarity between the selfed progenies and their respective parents in the degree of expression of any given character; some varieties however proved more heterozygous than others as revealed by the greater variation of their progenies. There was a high degree of correspondence between the progenies of a given variety selfed in different years.

When two varieties of similar type were crossed, their progeny closely resembled the selfed progeny of the same varieties, whereas crosses between varieties of different type gave segregating progenies with intermediate values, with a predominance of forms resembling that parent which was the more homozygous. The proportion of individuals with a given character appearing in the progeny of any cross corresponded roughly to the proportion in the aggregate of the selfed progenies of the two parents.

An essentially similar situation was observed in respect of other characters studied, namely time of maturity, resistance to *Phytophthora infestans* and to scab, tuber flavour, tendency to degeneration, and also, in figures taken from Torke, for Colorado beetle resistance, and from Salaman, for yield. It is thus possible to predict the results of crossing a given pair of varieties from their behaviour on selfing.

2812 LUPPOVA, V. P.
(Changes in tuber colour of potatoes due to different methods of grafting).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 64–66. [Russian].

Grafting experiments at Muromsk with several potato varieties, involving cleft grafts and budding the eyes of one variety on to the tubers of another, are reported. It was found that the F_0 plants formed tubers which were, in respect of colour, (1) like those of the scion variety, (2) like those of the stock, (3) intermediate, and (4) variegated. The scion variety exerted the greatest influence upon tuber colour of cleft-grafted plants when the tubers formed late, and the effects of the stock upon tuber colour of the budded plants was strongest on the tubers formed first. The most remarkable heritable changes in cleft-grafted plants are obtained by using stocks younger than the scions, by removing the tubers and foliage from the stocks, and in budded material, by using large tubers as stocks and leaving these undisturbed for the whole growth period.

2813 THIJN, G. A.
De afstamming en de nakomelingen van de Katahdin aardappel. (The ancestry and offspring of the potato variety Katahdin).
Euphytica, Wageningen 1952 : **1** : 57–59.

The origin of this potato is described with notes on its numerous offspring in the USA, Holland, and Ulster.

2814 LEICHSENRING, J. M. *ET AL.*
Factors influencing the nutritive value of potatoes.
Tech. Bull. Univ. Minn. Agric. Exp. Sta. 1951 : No. 196 : Pp. 96.

Information collected from various parts of the USA is reviewed; differences between varieties are noted in respect of ascorbic acid content of tubers at particular growth phases; decrease in ascorbic acid content during storage at room temperature and in refrigerators; and loss of reduced ascorbic acid during cooking. Those varieties with a high content of reduced ascorbic acid tend to transmit this characteristic to their progeny.

2815 STANTON, W. R.
Bolting, a vegetative variation in the potato.
Heredity 1952 : **6** : 37–53.

The occurrence of bolting, phenotypically expressed by increased length of stolon and haulm, abundant flowering and delay in the formation of tubers until late in the season, appears to be restricted to early and main crop varieties; abnormal plants have been found in 80% of the former. Although it is assumed that bolting arises as a somatic mutation, similar changes can be induced in normal

plants by artificially lengthening the photoperiod. It has been shown by grafting experiments at the John Innes Horticultural Institution that the abnormal condition is not transmitted cytoplasmically. Each variety has a characteristic frequency of mutation to the abnormal condition. Analyses of the percentage of bolting individuals in progenies resulting from reciprocal crosses between normal and abnormal parents and from crosses between two normal or two abnormal parents show that the influence of the variety is greater than the abnormal or normal state of the parents; thus crosses involving Flourball produced larger numbers of bolters than other crosses involving Doone Star and Majestic.

2816 Boock, O. J., and Paiva Neto, J. E.
Produtividade e composição mineral de diferentes variedades de batatinha. (**Yielding ability and mineral composition of different potato varieties**).
Bragantia, S. Paulo 1950 : **10** : 161–76.

Observations were made on ten potato varieties received from Holland and data are given on the habit, stand, time of maturity, yield, size of tuber, resistance to scab, *Rhizoctonia*, *Phytophthora* and nematodes, and content of water, P, Mg, Ca, K and total ash in the skin and in the flesh. The varieties most resistant to *Phytophthora* were Alpha and Voran, those giving the highest yields were Bintje and Eigenheimer, the former giving large tubers, the latter small. Little difference was noticed between varieties in respect of chemical composition.

2817 Sigle, K.
Stärkereiche Kartoffeln und Eiweissgehalt. (**Potatoes rich in starch and protein content**).
Mitt. dtsch. LandwGes. 1952 : **67** : 335–37.

Varietal studies showed that varieties rich in starch, e.g. Voran, Maritta, Monika, Robusta and Falke, are generally richer in pure protein than varieties with low starch content. Hence the author concludes that high pure protein content is not incompatible with high starch content in the fodder potato.

2818 Höppner, E.
Spezielle Sortenmerkmale. (**Special varietal characters**).
Kartoffelbau, Hamburg 1952 : **3** : p. 111.

Indications are given of the main features of flower, bud, leaf, and stem which serve to distinguish the main potato varieties at present grown in Germany.

2819 Fischnich, O. and Höppner, E.
Ein neuer Weg zur Bestimmung der Sortenechtheit von Kartoffeln. (**A new way of determining the authenticity of varieties of potatoes**).
Kartoffelbau 1952 : **3** : 87–91.

A drawback to Snell's method of determining the authenticity of varieties of seed potatoes is the length of time required. More recently Schulze and Fischnich found that sprouts from tubers treated with Rindite, then kept in darkness and later exposed to daylight, or artificial light, show a coloration typical for the different varieties. Höppner also showed that if the action of light is regulated by dosage, the coloration of the sprouts in tubers being investigated by Snell's method may be retarded and so observed in stages.
The above discoveries are the basis for the authors' study of the entire German collection of varieties, some of which are here described. The ultimate aim is to produce a loose-leaf key for identification of all the varieties investigated, with coloured charts as a further aid.

2820 Skibnevskaja, N. N.
(**A new method of determining earliness of potato varieties and seedlings**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 55–60. [Russian].

At the Moscow Research Station of the USSR Scientific Research Institute of Alcohol Industry a new method of determining earliness has been developed. The method is based on the determination of the position of the first inflorescence on young plants. This is associated with the development of highly dissected leaves, location of the leaf with the greatest number of leaflets and the branching character of the monopodium.
Breeding potatoes for resistance to diseases and earliness, involving the new method of selection, is reported. The material included selfings of Oktjabrenok [Little Octobrist], Switeź, and *Solanum demissum* var. *xitlense* 0/22, the F_1 from *S. demissum* x Hebron, *S. demissum* x Oktjabrenok, *S. demissum* x Katahdin, and *S. demissum* x Switeź and the multiple hybrids (*S. demissum* x Katahdin) x Hebron, (*S. demissum* x Katahdin) x Oktjabrenok, and F_1 (*S. demissum* x Katahdin) x Switeź. Some early material, 48s/46 from (*S. demissum* x Katahdin) x Oktjabrenok and 23s/46 from (*S. demissum* x Katahdin) x Switeź, was obtained. The former gave a promising early form 14875s/47 after a backcross to Oktjabrenok. Other early hybrids

with high starch contents have been bred from Moskovskiĭ [Moscow] x Berlichingen.

2821 KLINKOWSKI, M. and HOFFMANN, G.
Eine Methode zur Schorfresistenzprüfung der Kartoffel. (A method of testing scab resistance of the potato).
Züchter 1952 : **22** : 92–94.

The technique described is based on W. J. Hooker's infection-pot method for observing tuber enlargement and scab (*Streptomyces scabies*) development in potatoes. Special advantages claimed for the author's method are: (1) the course of the disease can be observed daily; (2) infection without injury to the surface of the tuber is possible; and (3) inoculum that has been accurately identified can be used, thus rendering the results from different varieties more readily comparable than in the usual field trials lasting several years.
The method is not suitable for use in mass selection, but is essentially a tool which will enable the breeder to detect resistant plants at an early stage in his work.

2822 JOHNSON, G. and SCHAAL, L. A.
Relation of chlorogenic acid to scab resistance in potatoes.
Science 1952 : **115** : 627–29.

The presence of a relatively large amount of chlorogenic acid in the tuber periderm is associated with scab resistance. The total amount of chlorogenic acid is not however as important as the local concentration; for instance, in some scab resistant varieties chlorogenic acid appears to be more heavily concentrated in or near the lenticels. Chlorogenic acid also accumulates around a tissue injury. The substance therefore appears to be involved in protective processes.

2823 BLACK, W.
Recent research in potato breeding for blight resistance.
Brit. Agric. Bull. 1952 : **5** : No. 19 : 15–18.

Research at the Scottish Plant Breeding Station, Corstorphine, leading to the discovery of four major genes controlling blight resistance and several minor genes modifying hypersensitive reactions to particular physiological races of *Phytophthora* is summarized (cf. Abst. 2039).

2824 STEVENSON, F. J., SCHULTZ, E. S., AKELEY, R. V. and CASH, L. C.
Late blight immunity in the potato.
Phytopathology 1952 : **42** : 277–80.

An historical survey is given of breeding for resistance to *Phytophthora infestans*, mainly with reference to work in the United States.

2825 KNAPE, P.
Aktuali jautājumi kartupeļu selekcijā. (Current problems in potato breeding).
Latv. PSR Zinātņu Akad. Vēstis 1951 : No. 2 (43) : 255–66. [Latvian].

Breeding potatoes for resistance to *Phytophthora*, wart, virus diseases and Colorado beetle in Latvia is reported. The methods included interspecific hybridization and back crosses.
Most of the recent material is still under trial at the Academy of Sciences of the Latvian SSR. It was obtained by multiple hybridization involving material previously bred by the present writer and sometimes more than one wild species.

2826 KEKUH, A. M.
(The application of vegetative and soil mentors to breeding potatoes for resistance to wart).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 21–27. [Russian].

Mičurinite methods of developing resistance to wart at the Žitomir Agricultural Institute consisted of vegetative hybridization and of growing hybrids susceptible to the disease upon soil irrigated with sewage water. Several hybrids showing resistance were obtained by each method. The initial material used for vegetative hybridization comprised hybrids susceptible to the disease which were selected at the institute for their other good economic properties. These hybrids were used as stocks and were grafted with the scions of several potato varieties including Fridoline, Carnea, Ella, Frühmölle and Ostbote, and of other species such as tomato. Training upon irrigated soil gave more rapid results, six of seven hybrids having developed resistance. Hybrids 4955, 49151 and 4945 are now under trial. Sexual hybridization is regarded as an unreliable method of obtaining wart resistant material since identical crosses may yield some hybrids carrying resistance and others that are susceptible. In this connexion hybrids produced at the Kiev Breeding Station of the Institute of Alcohol Industry are referred to. For instance, hybrid 1268/1945 from S6194 x Rosafolia showed resistance while hybrid 1328/1945 was susceptible to wart, hybrid 388/1946 from Courier x Rosafolia carried and hybrid 2475/1946 did not carry resistance, and hybrids 345/1945, 400/1945 and 348/1945 from Frühmölle x

S 15627 all showed resistance to the disease while several others proved susceptible.

2827 Montaldo, A.
Fitomejoramiento para resistencia a la nematosis de la papa. (**Breeding the potato for resistance to nematodes**).
Agric. Téc., Chile 1951 : **11** : 64–85.

Out of 896 varieties and seedlings tested in Chile for resistance to *Heterodera marioni*, 28 have shown some resistance, especially the varieties Royal Kidney, C 77–1 (an S_2 seedling of the semiwild variety Bastoneza morada) and President. Resistance appears to be conditioned by recessive genes.

2828 Langenbuch, R.
Ist das Fehlen eines "Frassstoffes" oder das Vorhandensein eines "Vergällungsstoffes" die Ursache für die Resistenz der Wildkartoffel *Solanum chacoense* Bitt. genenüber dem Kartoffelkäfer? (**Is the absence of a "feeding substance" or the presence of a "repellent substance" the cause of the resistance of the wild potato *S. chacoense* Bitt. to Colorado beetle ?**).
Z. PflKrankh. 1952 : **59** : 179–89.

Feeding tests showed that *S. chacoense* exists in two forms, one resistant and one susceptible but that the latter is eaten somewhat less readily than *S. tuberosum*. When discs of the two species were joined together the beetles avoided the disc of *S. chacoense* when the resistant form was used. When two discs of *S. tuberosum* were joined together with a paste containing expressed sap from *S. chacoense* the beetles also failed to feed. On the other hand the use of expressed juice of *S. tuberosum* to unite discs of *S. chacoense* caused no increase of feeding. The repellent effect of the *S. chacoense* juice was removed by treatment with active carbon. Infiltration of *S. tuberosum* leaves with juice of *S. chacoense* imparted resistance to them, but the repellent properties of *S. chacoense* leaves were not removed by injection with acetaldehyde.
These results make it clear that the resistance of *S. chacoense* is due to the presence of some repellent principle rather than the absence of an attractive substance.

2829 Hutton, E. M. and Peak, A. R.
The selection of spotted-wilt-resistant phenotypes in the potato (*Solanum tuberosum*).
Aust. J. Agric. Res. 1952 : **3** : 137–47.

Determination of resistance to spotted wilt by means of stem tip inoculation of vigorous plants at the flowering stage, using a strain mixture of the virus, has proved satisfactory. Brownell was highly tolerant of spotted wilt; the fact that this variety was the only one carrying virus X may have some significance in this connexion. In susceptible varieties the tip blight and necrotic strains of a mixture take part in the early stages of systemic infection. Of the hybrids bred by the author 40% were highly resistant to spotted wilt.

2830 Bercks, R.
Fortgeführte Freilanduntersuchungen über die Altersresistenz von zwei Kartoffelsorten gegen das X-Virus. (**Further investigations in the field on resistance to virus X due to age in two varieties of potatoes**).
Züchter 1952 : **22** : 85–91.

Age resistance in the potatoes Flava and Capella to virus X was not affected by conditions of nutrition similar to those in agricultural practice (cf. Abst. 1258).
Resistance made its appearance sooner in the medium early Flava than in the much later Capella.

2831 Höppner, E.
Die amtlichen Kartoffelprüfungen im Bundesgebiet. (**The official potato trials in the Federal Zone**).
Kartoffelbau, Hamburg 1952 : **3** : 25–29.

Höppner, E.
Zusammenfassende Sortenbeschreibung. (**Summarized descriptions of varieties**).
Ibid. 1952 : **3** : 55–59.

The results are given of trials in Germany using a great number of varieties, the aim being to determine which varieties (1) are the most high yielding, (2) must be withdrawn from the market as having been surpassed by newly approved varieties, (3) are suitable for certain districts. The plan for regional testing was elaborated by conducting trial series in a greater number of districts than hitherto, using partial collections of the material from the breeder. These trials were carried out as land trials taking into account the conditions in each district concerned. Complete collections will be used in further trials.
The summarized results show the ripening time, disease resistance, yield, and tuber qualities, e.g. flavour, size and shape, colour of flesh and skin, depth of eye, starch content and starch yield.

2832 JÄHNL, G.
Ergebnisse der Kartoffelversuche des Jahres 1951. (Results of the potato trials of the year 1951).
VersErgebn. Bundesanst. alp. Landw. Admont 1952 : No. 15 : Pp. 27. (Mimeographed).

These trials, carried out in various districts by the Federal Institute for Alpine Agriculture, Admont, Austria, comprised variety trials, continued long-term testing of collections of different geographical origins and trials relating to cutting and pregermination, cultivation and sowing times.
In the trials, 5 early and 11 late varieties were tested. The characteristics studied include yield, weight of 100 tubers, shape and size of tubers, flesh colour, number and colour of flowers, starch content of tubers and resistance to diseases of the haulm and tuber. Of the early varieties, Oberarnbacher Frühe gave the highest yield, followed by Böhms Allerfrüheste. Panther, a late variety, showed the highest yield of all 16 varieties. Aquila, which had given the best yields in the two preceding years, in 1951 only attained the figure of the average for the 16 varieties.
The results of the sowing time experiments from 1949 to 1951 show that sowing time has considerable influence on the yield and that this influence differs in degree according to the variety. In these tests Ackersegen and Aquila were found more reliable as regards yield than Bintje.

2833 WANG, H.
(Observations on the characteristics of recently introduced varieties of sweet potato).
Nungyeh Yenchiu (Agric. Res.) Taipeh 1951 : **2** : No. 3 : 91–116. [Chinese].

Extensive details are given of 71 varieties introduced into Taiwan from the mainland of China.

2834 COCKERHAM, K. L. and HARRISON, P. K.
New sweetpotato seedlings that appear resistant to sweetpotato weevil attack.
J. Econ. Ent. 1952 : **45** : p. 132.

The seedlings L 187 (32–10–5) and L 244 have shown a high degree of resistance to *Cylas formicarius elegantulus* in tests carried out during recent years at the Louisiana Agricultural Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 319).

2835 RANKIN, H. W.
Progress report on internal cork of sweetpotatoes.
Phytopathology 1952 : **42** : p. 287. (Abst.).

Varieties and selections showing a high degree of resistance to internal cork or complete freedom from this virus have been found, and are to be used in breeding.

FIBRES

2836 **Progress reports from experiment stations season 1950-1951.**
Emp. Cott. Gr. Corp. Lond. 1952 : Pp. 159.

Wickens, G. M. Cotton Research Station, Namulonge. Progress report for the season 1950–1951. Plant pathology. (pp. 12–20).

Different techniques of inoculating the seed, foliage, main stem and boll with bacterial blight have been studied, in connexion with breeding for resistance. At present no single criterion can be advocated, under conditions in Uganda, as a measure of effective resistance. The behaviour of Stoneville 20 is of particular interest. This variety showed a high degree of resistance except to angular leaf spot arising from foliage spraying and cotyledon infection from seed inoculation. It is pointed out that these two methods of inoculation are used in the Sudan and the USA, respectively, for assessing resistance. In the experiments at Namulonge, Stoneville 20 would have been graded as susceptible by either technique, whereas it has in fact exhibited a higher level of effective resistance in general than any other strain. BAR 7/8, carrying B_2 and B_3 for resistance, was highly resistant to seedling infection and fairly resistant to leaf and stem infection, but possessed no resistance to bacterial boll disease. B_2 alone confers hardly any resistance, as shown by results with BAR 7/1. BP 52 (modal bulk stock) was notable for its resistance to bacterial boll disease. Among the strains tested in a subsidiary experiment, by spraying the foliage with a suspension from agar cultures, was a BAR group, involving all the genes for resistance so far recognized as operative in the Sudan. BAR 4/18, with B_2 and B_{6m}, showed virtual immunity.
Strains were also tested for reaction to *Verticillium* wilt, using the technique of stem wound inoculation. V 135 (St. Vincent Sea Island) was very highly and uniformly resistant. Data

on progenies from resistant B 181 x susceptible BP 50 indicated a complex mode of inheritance of resistance.

Hutchinson, J. B., MacDonald, D. and Manning, H. L. Plant breeding. (*pp. 20–26*).

The results of scoring the type collection for *Lygus* leaf damage are given. Observations were carried out on material from Barberton, South Africa. It consists of three quality groups: U 4 strains and hybrids between U 4 and strains of similar quality; crosses within upland, in which one parent was of high quality; and U 4 x Sea Island interspecific hybrids. Selection of BP 52 progenies by the modal bulk technique continued (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2822). The results of district variety trials are reported; the yield advance achieved in BP 52 at the stage of these trials was about 10%.

Jameson, J. D. and Thomas, D. G. Uganda cotton variety testing and seed distribution. (*pp. 35–44*).

A detailed account is given of BP 52 and S 47, with regard to their history, performance in trials and seed distribution. The distribution of S 47 is to be extended over the whole of the Eastern and Northern Provinces, except Busoga. Work on the transference of blackarm and *Verticillium* wilt resistance from B 181 and KP 28 to S 47 continued. S 4108 has shown a high degree of blackarm resistance, even after hail, and has given considerably higher yields of cleaner cotton than any other variety in the district trials. It is to be used as donor parent in transferring blackarm resistance to S 47. S 4108 originated as an offtype from N 17 of unknown male parentage.

Peat, J. E. and Munro, J. M. Tanganyika Territory. Lake Province. Progress report for the season 1950–51. (*pp. 45–59*).

Albar 51 is to be used in breeding for resistance to bacterial blight instead of Albar 49. Albar 51 has the advantages of fuzzy seeds, good lint qualities and reasonably satisfactory ginning percentage. Strains of 7/150, a derivative of a selection from MZ 561, are being used as parents in hybridization for improved jassid resistance. The release of UK 51 is announced.

Williams, R. O. Kenya. Nyanza Province. Cotton experiments, season 1950–51. (*pp. 64–67*).

The results of two varietal trials are summarized: (1) a comparison of the introduced cottons S 47 and UK 48 with local BP 52 and N 17; and (2) a test of S 47 and four of its derivatives against local BP 52.

Anson, R. R., Rose, M. F. and Hughes, L. C. Anglo-Egyptian Sudan. Progress report of the plant breeding stations, season 1950–51. The Gezira Station. (*pp. 69–74*).

The main breeding material has been reduced to 1730 type BAR 4/16 and the Sakel cottons BLR 14/16 and BAR 14/1. In a late sown trial all leaf curl selections of Domains Sakel showed significantly lower infection than the control Domains Sakel. In future, selection for leaf curl resistance will be carried out under the more rigorous conditions at Shambat. Tables are given summarizing the results of yield and spinning tests of blackarm resistant strains and the susceptible types from which they have been derived.

Knight, R. L. and Sadd, J. Shambat Station. Economic genetics. (*pp. 75–79*).

In the production of varieties of the Egyptian type resistant to both blackarm and leaf curl, BLR 14/16 (B_2) and BLR 14/25 (B_2 and B_3) were further selected for leaf curl resistance. Work on the retransference of *B* genes from *G. arboreum* to Sakel continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2422). B_{6m}, a strong intensifier of blackarm resistance, is being transferred to B_2B_3 Sakel and B_2B_3 1730 to obtain *G. barbadense* strains immune from blackarm. The following transferences of genes to Sakel have reached an advanced back cross stage: the gene of tetraploid *G. herbaceum* (Wagad 8), B_5 from Grenadines White Pollen and B_7 from Stoneville 20.

Work on the development of American upland strains resistant to blackarm included crosses undertaken to add B_3 to a strain of Uganda BP 52 already homozygous for B_2 and at the same time to strengthen the complex of minor genes for resistance, and to add B_3 of BAR 11/16 to BAR 11/5 (B_2).

The strain BLJR 14/23, resistant to blackarm (B_2) and leaf curl and also homozygous for the gene H_1 conditioning hairiness, was synthesized for use as a back-cross parent in transferring hairiness. The full degree of the hairiness of MU 86 was recovered in the F_2 of the third back cross to Sakel; plants with maximum hairiness were crossed with BLJR 14/23 and selfed seed has been secured from the hybrids. In transferring the hairiness of Philippines Ferguson to Sakel, the aim has been to separate minor genes and genes intensifying hair length from the major factor for hairiness, and to

impart these to Sakel homozygous for H_1 and B_2. Plants showing good length of hair were recovered from the F_2 of the fifth back cross. Work with the genes for hairiness of several other species continued.

F_3 plants of *G. thurbadense* x Domains Sakel[3] with Pressley strength indices of up to 10·2 were selected; the BLR 14/16 controls had an index of 7·7.

Progress is reported in the transference of increased number of locules from *G. sanguineum*, tetraploid *G. herbaceum* (Wagad 8) and Philippines Ferguson to Sakel. A study of the genetics of locule number in upland strains has been initiated. The F_1 of the cross between *G. auritum*, a species having 9–13 ovules per locule, and BLR 14/16 with 5–6, had 6–10 ovules per locule with a strongly marked mode at 8. Seed of the first back cross to BLR 14/16 has been secured.

Owing to the wrinkled inner surface of its carpels, *G. contextum* is resistant to blowing out of the bolls by wind. This species was crossed with BLR 14/16, with a view to imparting resistance to wind damage to Sakel. The boll adherence of *G. contextum* was partially dominant in the F_1.

Douwes, H. and Cuany, R. L. Cytogenetics. (*pp. 80–82*).

In widening the range of synthetic allopolyploid material, seed has been obtained from the cross *G. arboreum* x *G. Klotzchianum* var. *Davidsonii*, and a hybrid of the genomic constitution ADAB has been produced by crossing *G. thurboreum* and *G. arbanomalum* (colchicine-doubled *G. arboreum* x *G. anomalum*). Data from hybridization between wild species indicate that *G. Areysianum* possesses genome E and *G. triphyllum* genome B. The chromosome number of *G. Robinsonii* is $2n = 26$. Vigorous hybrids, which have not yet flowered, have been obtained by crossing *G. Robinsonii* with *G. Sturtii*. Acala UA 2–15, and most of the cottons from Coimbatore, India, carry B_2 for blackarm resistance. The most promising of the latter, including three lines derived from *G. herbaceum* (1027 ALF) x *G. hirsutum* (Dharwar American) back-crossed to Dharwar American, have been sent to Namulonge for further study.

Crosses between blackarm susceptible types possessing suitable characteristics and standard strains of *G. barbadense* and *G. hirsutum* carrying *B* factors were made, to develop material for linkage tests.

Transference of B_2 and B_3 from BAR stocks and of hairiness from MU 8b to strain SUS 16/1 of Wilds 16 is progressing.

The genetics of smooth boll, striped boll and curly rogue is being analysed. The homology of the gene for leaf shape in narrow-leaved *G. hirsutum* race *Palmeri* is being investigated in crosses involving Okra and Super-Okra.

Cross-over values for *P* and *Ne* are 6% and 14% in *G. herbaceum* x *G. arboreum* and intraspecific crosses of *G. arboreum*, respectively. The homology of the Asiatic gene R_2 for red leaf and B_4 transferred to *G. barbadense* in two cytologically different ways is being tested.

Barlow, K. C. Kadugli Station. (*pp. 83–91*).

Cotton. Breeding material of BAR 7/8, BAR SP 84, BAR NT 96/40 x BAR SP 84 F_1 and Intra BAR SP 84 F_1 was selected.

The blackarm resistance of BAR 7/8, which carries B_2 and B_3, has been outstanding. Gene B_2 by itself is insufficient as a means of blackarm control.

Sesamum indicum. Bulks of Kadugli Early Resistant White and Kadugli Resistant White were grown; these varieties are resistant to the bacterial disease marad ed dam. Further work was carried out to improve disease resistance and other characters in white and red types.

Ducker, H. C. Nyasaland. Season 1950–51. Cotton Experiment Station. (*pp. 92–97*).

Different stocks of Crown Land were selected. The material retained included blackarm resistant plants of CL 20. Hybridization of the blackarm resistant Albar with CL 20 lots is under way. Albar probably originated from a cross between Nigerian Allen and *G. punctatum*.

McKinstry, A. H. and James, R. W. Southern Rhodesia. Cotton Research Station, Gatooma. Progress report for the season 1950–51. (*pp. 98–104*).

Susceptibility to blackarm has proved to be the chief limiting factor in breeding MU 8A and BP 52[2] strains possessing improved lint quality. A new programme of crossing for blackarm resistance is under way.

King, H. E. Northern Nigeria. Progress report for the season 1950–51. (*pp. 105–15*).

Progress in the selection of derivatives of Samaru 26C for several characters is reported. New nucleus stock of Samaru 26C was produced by a technique designed to give in the shortest possible time a purified bulk reduced in variability but intrinsically unchanged. The process combines features of three different methods: the replicated progeny row test as advocated by Hutchinson and Panse; the mass pedigree

system of Harland; and the filtering or modal bulk technique used in the Sudan and Uganda.

Lochrie, J. V. West Indies. Cotton experiment stations, season 1950–51.
Lochrie, J. V. and Spence, J. R. Cotton Experiment Station, Antigua. (*pp. 133–44*).

The problem of the lower quality of MSI in Antigua and Nevis than when raised in Montserrat and St. Kitts is receiving attention. It is considered that a third commercial variety with a spinning value between MSI and V 135 is desirable. Yield and spinning tests are therefore being carried out on VH 8, VH 10 and BD.

Harper, A. S. Cotton Breeding Station, Montserrat. (*pp. 144–47*).

Selection of MSI continued.

Francis, H. A. Camden Park Experiment Station, St. Vincent. (*pp. 147–49*).

In a small bulks trial VH 8 hybrid strains and V 135 did not differ significantly in yield. VH 8 stocks compared favourably with V 135 in yarn strength.

Peters, R. W. Queensland. Regional Experimental Station, Biloela. Progress report for the season 1950–51. (*pp. 150–59*).

Work on the jassid resistant back-cross strains of Miller continued. In a variety trial under unirrigated conditions, Empire, D & Pl 14 and Stoneville 2B developed open types of habit suitable for machine harvesting; Empire was outstanding for its earliness and boll size.

2837 Boza B., T.
Pasado, presente y futuro del algodón Tangüis. (**Past, present and future of Tangüis cotton**).
Convención Agríc. de los Valles de la Costa, Central Algodonera Perú, Chincha Alta, 14–16 Dec. 1951 (1952) : Pp. 12.

The many virtues of the variety are recounted. In the course of its rapid multiplication to become the almost sole variety grown in Peru it lost some of its initial characteristics, including wilt resistance, and its quality deteriorated. The efforts of plant breeders in Peru to combat this deterioration are described.
Breeding work at present is directed towards earlier maturity, resistance to various insects, to wilt (*Verticillium albo-atrum*) and to root rot (*Thielaviopsis basicola*) and further improvement in quality. Some promising selections are already available.

2838 L'activité de l'I.R.C.T. pendant la campagne 1949-1950. (**The work of the IRCT during the season 1949-50**).
Cot. Fib. Trop. 1951 : **6** : 1–44.

The following account is given of the work of the Institute for Research on Cotton and Exotic Textiles (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2684):—

Rabat Agronomic Research Centre (*Morocco*).
Selection and hybridization work on cotton is in progress to improve yields and earliness, and comparative trials are also being run in several regions.
Linseed and flax are being tested for their suitability at Rabat and a collection has been made of hemp varieties from Morocco, Turkey, Italy, Yugoslavia, Bulgaria, the Lebanon and France: in yield the Moroccan populations were superior, but French varieties matured earlier.

Bouaké Station (*French West Africa*).
Details are recorded of progress in selection work on cotton. Considerable morphological uniformity has been attained, with complete absence of blackarm though severely attacked *barbadense* cottons were growing near; yields are moderate, with a good length of lint, but the ginning outturn needs to be improved. Hybridization work is also proceeding to increase ginning outturn and resistance to jassids, *Lygus* and mites.
Controlled crosses included material from simple crossings, back-crossing and multiple crosses, e.g. Mu 8b and NT–205–43, resistant to jassids, mites and *Lygus* and very villous; Samaru 26C with a high yield of fibre; and 4307–1109–2901. Among the 60 different varieties in the collection at Bouaké, Mu 8b and Nt 205–43 are mentioned for their marked hairiness, and Hibreed, Western Prolific and Iran for their fibre yield.
Work on ramie, kapok and *Dombeya Buttneri* is in progress.

M'Pesoba-Koutiala Station.
In trials of the local M'Pesoba cotton and the lines 1113 and 0919, the last named nearly equalled M'Pesoba in seed yield and surpassed it in ginning outturn by 2%. The yields of fibre in kg. per ha. were 130 for M'Pesoba and 137 for 0919.

Anie-Mono Station (*Togoland*).
Selection of plants of Togo Sea Island for breeding material was carried out and the Togo Sea Island population was subjected to analysis. In trials at Dahomey, N'Kourala 4307 and 1109 far exceeded the local cotton, a derivative of *G. peruvianum*, in yield of seed.

Varieties were studied for resistance to insect pests and leaf curl. In Togoland, N'Kourala 4307 showed no signs of leaf curl or jassid attack.

Tikem Station (*French Equatorial Africa*).
Lines of the following varieties underwent selection, Tika, Samaru 26C, N'Kourala and Allen, for morphological characteristics, amount of infestation by pests, and uniformity.
Dominance in the resistance of some N'Kourala selections to bacterial disease, due to *Xanthomonas malvacearum*, was evident in a trial with NT 205/43, Bar 11/2, Allen, Sakkha 4, and a first backcross to the F_1 of N'Kourala (resistant) x Tika. Resistance may possibly be correlated with yellow flower.
In the Chad region, seed setting, flowering and shedding are being studied and the effects of suppressing flowering for certain periods upon seed production are recorded.
Attempted control of *Diparopsis* by using cottons varying in flowering period failed.

Bebedjia Station (*Chad*).
Selection was carried out for yield, fibre length, ginning outturn and pest resistance in the N'Kourala type élites, Tika, N'Kourala, Allen and Samaru 26C.
N'Kourala 42–5 and 46–5 were used in crosses with U4–5193, Bar 10/2, NT, Delfos and D 61 E3, introduced from Bambari.
N'Kourala was never seriously damaged by blackarm; whether owing to the presence of one or more genes for resistance or to the weakness of the strains of *X. malvacearum* is not known.
Some lines very resistant to *Ramularia* have been found, e.g. NK 46–5.

Bambari Station.
Activities include genetic research for the central zone of Oubangui and pedigree and mass selection of cotton. Fibre length and strength are also of interest as a basis of selection.
The hybridization programme includes backcrossing of F_1 selections to transfer blackarm and jassid resistance to certain lines. Four new series of crosses were begun in 1950.
The total number of artificial pollinations in 1949 was 601 and a set of 31% was obtained.
The new variety D 61 E3, intended for eastern Oubangui, showed severe blackarm and rot of the capsules in large scale sowings at the station, where a yield of 254 kg. of seed was obtained; but little damage by jassids or *Dysdercus* was noted.
Variety trials were also run at the station and in outlying districts.
Bacterial disease is being studied in local and imported varieties and F_1 hybrids whose ♂ parent was Bar 10/2. Susceptibility ranged from 12 for Rogers Acala and Banda to 6 for NT 205/43. Rogers Acala and Banda proved very susceptible to the blackarm phase, Tigri and D 61–G1 moderately so, and NT 205/43 only slightly so.
In the F_1s of the various crosses involving Bar 10/2, the gene B_2 is not dominant and its effects seem to be of the intermediate type.

Bossangoa Station (*Oubangui*).
Selection and multiplication of cotton and also the crosses D61 E3 x N'Kourala and Triumph x N'Kourala were carried out.

Gambo Station (*Oubangui*).
A reselection of D 61 E3 equalled H–4 in yield per ha. and was superior in technological quality.

Station for Fibres at Madingou (*Central Congo*).
A variety of *Urena lobata* from Nigeria has been retained for its earliness, good development and absence of tendency to branching; its seeds are much larger than those of other varieties.
A section for research on ramie is to be established.

2839 Brown, M. S. and Menzel, M. Y.
Additional evidence on the crossing behaviour of *Gossypium gossypioides*.
Bull. Torrey Bot. Cl. 1952 : **79** : 285–92.

The close affinity observed between *G. Raimondii* (D_5) and *G. gossypioides*, which caused the latter to be assigned the genome symbol D_6 (cf. Abst. 2064), has been further substantiated by the production of vigorous *G. Raimondii* x *G. gossypioides* hybrids. *G. gossypioides* gave rise to an inviable hybrid with *G. Thurberi*. Since seeds have been obtained from the cross (*G. Thurberi* x *G. Raimondii*) x *G. gossypioides* it is thought that the inviability of *G. Thurberi* x *G. gossypioides* hybrids may be due to a relatively simple genetic mechanism confined to one or a few chromosomes of the respective genomes.

2840 Brown, C. H.
A cotton breeder's musings.
Emp. Cott. Gr. Rev. 1952 : **29** : 199–201, 281–84.

The progress of cotton breeding in Egypt is surveyed, with particular reference to the maintenance of maximum genetic variability within a stock, from which new combinations of desirable qualities can be selected. By this method earliness and ginning outturn have been

successfully increased. It has also been possible to detect small genetic differences, previously obscured by environmental variations, among established types subjected to reselection.

2841 Lochrie, J. V.
Sea Island cotton varieties in the West Indies.
Emp. Cott. Gr. Rev. 1952 : **29** : 118–21.
The problem of the lower spinning quality of the variety MSI in Antigua and Nevis compared with the cotton from the same variety when grown in other islands of the Leeward group is discussed. The low quality was found to be associated with time of planting. Radical change in planting season was not however feasible; search for a variety with higher spinning quality was therefore undertaken some years ago. At present VH 8, developed in the course of the programme of hybridization between V 135 and MSI carried out in St. Vincent, shows particular promise. In fairly large scale tests it has shown improved spinning performance. Compared with MSI it has however a lower ginning outturn and somewhat smaller boll. Further information is being obtained on its yielding capacity and spinning quality.

2842 Rao, K. S. and Narasimhamurthy, G.
Westerns 1. Cotton—its status and work in progress for its spread.
Madras Agric. J. 1952 : **39** : 215–17.
Although numerous varieties, including 2800 and the American introductions MA 11 and G IX Co. 2 have been tested in the Indian cotton growing tracts of Bellary, Anantapur, Kurnool and Cuddapah, none is more suitable for the area than H 1, a strain of *Gossypium herbaceum* developed at the Hagari Agricultural Station.

2843 Cuany, R. L.
Impressions of American cotton research.
Emp. Cott. Gr. Rev. 1952 : **29** : 171–81.
An account of a visit to research stations in Arkansas, Oklahoma, Texas and North Carolina outlines current research on problems of disease resistance, fibre quality and adaptability to mechanical harvesting. The use being made of wild species and variable types within upland cottons is emphasized.

2844 Balasubrahmanyan, R. and Kesava Iyengar, N.
Breeding for blackarm resistance in Madras.
Indian Cott. Gr. Rev. 1952 : **6** : 9–15.
Further information regarding the blackarm resistance of introductions and locally bred hybrids is reported, based on the results of recent trials at Coimbatore, Siruguppa and Palur. Among introductions thought to be resistant, BAR 12/1 and BAR 12/2 from the Sudan and T 96 from Africa proved susceptible under field conditions.
A high degree of resistance was, however, shown by two selections 2196–4/4 and 2196–4/5 made at Surat from a synthetic polyploid derived from BC 134 (*Gossypium herbaceum* x *G. hirsutum*) x CW–3–1–7. Both selections give high yields of good quality, but have been crossed with selected types to improve jassid resistance and earliness. Other interspecific hybrids possessing blackarm immunity have been reported from the USSR (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 392).
The genetical basis of reaction to *Xanthomonas malvacearum*, established by Knight (cf. Abst. 550), is discussed briefly.

2845 Smith, A. L. and Dick, J. B.
The inheritance of resistance to *Fusarium* wilt in upland and Sea Island cotton.
Phytopathology 1952 : **42** : 287–88. (Abst.).
Susceptibility to nematode had a considerable effect upon reaction to *Fusarium* wilt and segregation ratios obtained for resistance and susceptibility to this disease. The view is expressed that by transferring the wilt resistance of *Gossypium barbadense* to upland cotton by back-crossing and selection for nematode resistance following each back cross, a high degree of wilt resistance can be built up in upland varieties.

2846 Wiles, A. B.
A seedling inoculation technique for testing cotton varieties for resistance to *Verticillium* wilt.
Phytopathology 1952 : **42** : p. 288. (Abst.).
Dipping the roots of four-leaved seedlings in a suspension of *V. albo-atrum* was found to be a satisfactory method of inoculation for testing the reaction of cotton varieties and strains to this disease.

2847 Sun, E. M.
(The utilization of upland cotton varieties tolerant of insects).
Nungyeh Yenchiu (Agric. Res.) Taipeh 1951 : **2** : No. 2 : 51–68. [Chinese].
Four Taiwan upland cotton hybrids and the variety Buri are tolerant of the leaf hopper

Chlorita biguttula and outyield susceptible varieties when infestation is severe. The tolerant varieties, however, have insufficiently long staple to be commercially acceptable.

2848 Hawkins, B. S., Steele, T. E., Ballard, W. W. and Stacy, S. V.
Cotton variety tests 1947-49.
Circ. Ga. Agric. Exp. Sta. 1950 : No. 164 : Pp. 8.

The results of extensive trials of Empire, Stonewilt, Deltapine 15 and 041 and other cotton varieties and strains in Georgia during the above three-year period are summarized.

2849 Self, F. W. *et al.*
Experiments with cotton varieties in Louisiana 1947-1950.
Bull. La. Agric. Exp. Sta. 1951 : No. 460 : Pp. 16.

The results of variety trials carried out at five stations in Louisiana are summarized.

2850 **1951 Arkansas cotton variety tests.**
Mim. Ser. Ark. Agric. Exp. Sta. 1952 : No. 8 : Pp. 10.

The results of cotton variety trials at several centres in Arkansas are given in tabular form.

2851 Culbertson, J. O.
Registration of improved varieties of flax, V.
Agron. J. 1952 : **44** : 153–54.

The registration of Sheyenne (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1454) and Redwood (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1195) is reported; full descriptions are given of each variety.

2852 André, É. and Kogane-Charles, M.
Sur la teneur en huile et en linamaroside des graines d'une série de variétés de lin. **(On the oil and linamaroside content of the seeds of a series of flax varieties).**
CR Acad. Sci. Paris 1946 : **223** : 457–59.

A series of fibre, oil and dual purpose flax varieties from the Versailles Breeding Station were examined for seed size, oil content and content of the cyanogenetic glycoside linamaroside. In general, the fibre varieties had smaller grains, a lower oil content and a higher content of the cyanogenetic glycoside. The variety Liral Suffolk was exceptional in being a fibre flax with a low glycoside content.

2853 Danell, N.
Försök med spånadslin. Resultat av växtodlings-, ogräs- och gödslingsförsök under åren 1943 (38)—1950 (51). [**Trials with fibre flax. Results of cultivation, weed and manuring trials during the years 1943 (38)–1950 (51)**].
Medd. Stat. Jordbruksförsök, Stockholm 1952 : No. 39 : Pp. 57.

Danell, N.
Försök med spånadslin. Resultat av växtodlings-, ogräs-, och gödslingsförsök under åren 1943–1950. (**Trials with fibre flax. Results of cultivation, weed and manuring trials during the years 1943-50**).
Försök och Forskning 1952 : **9** : 32–33.

The yield of straw and seed of flax varieties from Sweden, Latvia, Lithuania, Holland and other countries is recorded.

2854 Hoffmann, W.
Die Vererbung der Geschlechtsformen des Hanfes (*Cannabis sativa* L.) II. [**The inheritance of sex forms in hemp (*C. sativa* L.) II.**].
Züchter 1952 : **22** : 147–58.

Further reference is made to the author's theory of sex determination in hemp (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 401). Two diecious lines were pollinated with feminized monecious forms and gave an F_1 with an average of 92·5% of females. The proportion of females was somewhat less when the Müncheberg uniform-ripening hemp was used as pollinator and lower still with hermaphrodite hemp, monecious plants of varying grades being produced, in proportions varying in different progenies but reaching as much as 21% in some. When the tops and the remaining female flowers were removed and the plants allowed to grow up again, the proportion of monecious plants was increased by roughly 20%, the actual percentage varying in different progenies.
All the extreme monecious plants proved heterogametic for the XY chromsomes, as were the normal males of uniform ripening and hermaphrodite hemps; the feminized types however contained both heterogametic and homogametic plants, though the former were in the majority. Masculinized males were all homogametic, masculinized monecious types comprised both heterogametic and homogametic plants.
The results confirm the author's view that the sex types in hemp are polygenically conditioned

and that the genes influencing sex are present in both the autosomes and sex chromosomes.
It is suggested that the hybrids of diecious x feminized monecious plants if suitably backcrossed could be used in practice to produce a predominantly female population which might then be used for the production of heterosis seed by further three-way crossing.

2855 Mothes, K. and Engelbrecht, L.
Über geschlechtsverschiedenen Stoffwechsel zweihäusiger einjähriger Pflanzen. I. Untersuchungen über den Stickstoffumsatz beim Hanf (*Cannabis sativa* L.). [**On a metabolic difference, according to sex, in diecious annual plants. I. Investigations on nitrogen metabolism in hemp (*C. sativa* L.)**].
Flora, Jena 1952 : **139** : 1–27.

A physiological study of two different diecious races of hemp, from the time of lateral shoot formation and of visible differentiation of the sexes till maturity, revealed distinct differences in the metabolism of the ♂ and ♀ plants. The possibility that sex differences also underlie the changes often observed in the metabolism of hermaphrodite plants during flowering and fruit formation is discussed.

2856 Chandnani, J. J. and Chatterjee, D.
Delhi can grow jute.
Indian Fmg. 1952 : **2** : 16–17.

Three varieties of *Corchorus olitorius*, IC 326, IC 327 and 0–40–753, and two of *C. capsularis*, IC 328 and IC 329, appear to be suitable for irrigated land in Delhi. All five grew taller than 10 ft. in trials at the Indian Agricultural Research Institute, New Delhi, during 1950 and 1951.

2857 Ossewaarde, J. G.
Recommendations on the growing of wild stokroos.
Fmg. S. Afr. 1952 : **27** : 243–45.

At the Barberton Agricultural Research Station, South Africa, imported varieties of *Hibiscus kitaibelifolius* from Brazil and *H. cannabinus* from Java have shown greater resistance to drought, local pests and diseases than the South African representatives of *H. cannabinus* and the indigenous *H. Mastersianus*. Selections with a high degree of resistance to *Aecidium Garckeanum* were made from the following *H. cannabinus* introductions: Java, Peru, El Salvador, Egyptian Roundleaf and Egyptian Daggaleaf; they are to be used for breeding purposes. All the *H. kitaibelifolius* introductions are rust resistant, but many bear spines which cause discomfort during harvesting; however, several selections with spineless main stems have been made at the station. In general, the percentage fibre content of *H. cannabinus* varieties is superior, but growers are recommended to plant both species.

2858 Medina, J. C.
La sélection du sisal, *Agave sisalana* Perrine. (**The breeding of sisal, *A. sisalana* Perrine**).
Cot. Fib. Trop. 1951 : **7** : 133–40.

A technique of artificial crossing has been devised in Brazil in which inflorescences for emasculation and pollination are induced to grow low down on the stem by lopping the floral stalk at a height of about 3 metres and then bending the plant over towards the ground so that the floral branches subsequently formed can be easily reached by the operator. All the *A. fourcroydes* x *A. sisalana* hybrids obtained showed the undesirable leaf spines, in spite of considerable morphological variation in other respects.
A study of the weight and number of leaves in 1400 plants of *A. sisalana* at the Ribeiro Prêto Research Station indicates that individual selection of the sisal grown in São Paulo could not result in more productive clones, as variation is so slight. Probably the same would hold in other parts of the world, since all cultivated sisal seems to have come from a small collection of plants introduced into Florida from Mexico in 1893.
The sisal collection at the Campinas Agronomic Institute contains two mutant plants found in 1939 in a commercial planting.

2859 Luna Ercilla, C. A.
Aprovechamiento industrial de plantas indígenas textiles. (**Industrial utilization of indigenous textile plants**).
Bol. Produc. Fomento Agríc. 1951 : **3** : No. 29 : 3–71.

The article includes a list of the Bromeliaceous species, indigenous to the Argentine Republic, which are of interest for use in the manufacture of jute substitutes and other textiles. Information is given on the morphology and biology of the species, their vernacular names, the properties of their fibre, their geographical distribution, the composition of the soil on which they grow, the possibilities of introducing them into cultivation and probable fibre yields.

2860 RICHHARIA, R. H.
Inter-varietal hybridization in *Luffa acutangula* and its economic significance.
Proc. Bihar Acad. Agric. Sci. 1952 : **1** : No. 1 : 1–9.

In the cross between the hermaphrodite variety Satputia 1 and the monecious Jhingli 1 inheritance of sex is determined by two independent factor pairs, *Aa* and *Bb*. Moneciousness and the development of female flowers depend upon *A* and *B*, respectively, *A* being epistatic to *B*. Plants recessive for both pairs are hermaphrodite. Node colour is controlled by a single factor pair, *Nn*, and seed surface by another pair designated *Pp*; no linkage was detected between *N* and *P*. It is concluded that fruit production could be increased 5·6 times by using open-pollinated seeds collected from female plants (*aaBB* or *aaBb*) appearing in the F_2; fruit production could be further increased by culling monecious plants at the seedling stage.

SUGAR AND STARCH PLANTS

2861 DE SORNAY, A.
Cane breeding in Mauritius. Some aspects of the current work.
S. Afr. Sug. J. 1952 : **36** : 149–55.

Some of the main objectives of sugar cane breeding are outlined with a brief survey of crossing techniques and methods of evaluating parent varieties and seedling selections. Particular crosses mentioned involve the use of outstanding parents such as POJ 2878 and Uba Marot.

2862 CRAMER, P. J. S.
Sugar-cane breeding in Java.
Econ. Bot. 1952 : **6** : 143–50

An historical account is given of sugar cane breeding in Java.

2863 HALAIS, P.
Aperçu des communications d'intérêt agricole présentées au Septième Congrès de l'Association Internationale des Techniciens de la Canne à Sucre. (**A brief record of the communications of agricultural interest presented before the Seventh Congress of the International Society of Sugar Cane Technologists**).
Rev. Agric. Maurice 1951 : **30** : 53–83.

An account of the above conference, already reviewed in *Plant Breeding Abstracts*, Vol. XXII, Abst. 1291, is here provided in French, with special regard to information of interest to cane growers and breeders in Mauritius.

2864 **Twenty-first Annual Report of the Sugarcane Research Station, Department of Agriculture, Colony of Mauritius 1950** (1952) : Pp. 41.

A new variety, M 423/41, was released for general distribution; it was derived from the popular cane M 134/32 and had shown promise in previous yield trials (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2012).
Details are given of intervarietal and interspecific crosses carried out at Reduit and Pamplemousses, using the same parents as in previous years. E 1/37 was used in numerous crosses in an attempt to produce more seedlings adapted to the poorer leached soils of the colony. Results of yield trials with seedlings and ratoons of different ages are summarized.
Field trials of varieties of oats, sorghum, rice, linseed, sweet potato and groundnut were also undertaken.

2865 DE SORNAY, A.
La sélection de cannes de graines en repousse. (**The selection of seedling canes at the ratoon stage**).
Rev. Agric. Maurice 1951 : **30** : 120–24.

In this address the author combined an explanatory introduction on genetic principles, as applied to cane breeding, with the substance of his paper on seedling selection from first ratoon populations, subsequently read at the Conference of the International Society of Sugar Cane Technologists (cf. Abst. 1291).

2866 GRASSL, C. O.
Cane breeding work at Canal Point.
Sug. Bull. N.O. 1952 : **30** : 167–69.

Details are given of numerous sugar cane crosses carried out during 1951 at Canal Point, Fla. Many crosses have been directed towards special objectives, including: the development of a high sugar content early in the season; cold hardiness; and increased resistance to borers, red rot and root rot. New breeding lines are being established by inducing varieties which do not generally flower in Florida to produce inflorescences under greenhouse conditions.

2867 PALIATSEAS, E., STEIB, R. J., DUCKELMAN, P. H. and CHILTON, S. J. P.
The production of true seed of sugarcane in Louisiana.
Sug. Bull. N.O. 1952 : **30** : 200–01.

Several interesting crosses made during the hybridization programme begun at Grand Isle,

La., in 1948 include CP 34–120 x CP 29–116, CP 34–120 x Co. 281 and CP 29–116 x Co. 281; at Canal Point, Fla., CP 29–116 and Co. 281 are male sterile.
It was noted that under greenhouse conditions at Grand Isle the flowering periods of early and late varieties tended to overlap, thus making further unusual crosses possible.

2868 **Low temperature storage keeps sugarcane seed viable for many months.**
Crops and Soils 1952 : **4** : No. 8 : p. 27.
Storage techniques developed at Houma, La., enable sugar cane breeders to save seed from new crosses while samples of the progenies are evaluated in the field. Seed viability has been extended from 6–12 weeks to 2 years.

2869 Khanna, K. L., Sen, S. C. and Bandyopadhyay, K. S.
Sampling studies in sugarcane. IV. The estimation of fibre content.
Proc. Indian Acad. Sci. 1950 : **32** : Sect. B : 269–88.
Data are presented concerning studies undertaken at the Central Sugarcane Research Station, Pusa, Bihar, to determine the minimum size of samples for estimating the fibre percentage of stalks of Co. 313, Co. 299 and Co. 356.

2870 **Annual Report of the Sugar Agronomy Division of the Department of Agriculture, Trinidad, 1950** : Pp. 23.
Revised methods in use at the Central Experiment Station, Centena, for selecting commercially desirable clones from canes introduced from Barbados are outlined.
Results of varietal trials show that on numerous estates B 41211, B 41227 and B 37161 gave high yields of cane and good quality juice.

2871 Lal, K. N. and Mehrotra, O. N.
Studies in crop physiology. On some physiological attributes of transpiring surface in relation to drought resistance in sugarcane.
Proc. Indian Acad. Sci. 1950 : **32** : Sect. B : 179–204.
Varietal differences were observed in leaf characters of 12 Coimbatore canes. It is suggested that Co. 313, Co. 356, Co. 76 and Co. 205, whose leaf characteristics approach those of the drought resistant Rheora, may be equally tolerant of drought.

2872 Lal, K. N. and Mehrotra, O. N.
Studies in crop physiology. Interrelation between leaf area, leaf indices and drought resistance in sugarcane.
Proc. Indian Acad. Sci. 1950 : **32** : Sect. B. : 252–68.
Leaf area and other leaf characteristics of six Coimbatore sugar cane varieties are correlated with relative drought resistance. Co. 205 most closely resembles Rheora, a notably drought resistant variety.

2873 Wiehe, P. O.
Leaf scald and chlorotic streak. Two sugar cane diseases occurring in British Guiana, Demerara 1951 : Pp. 33.
A section on varietal reaction to leaf scald (*Xanthomonas albilineans*) in British Guiana is included. Among commercial canes, B 4098 and Co. 421 have shown resistance. Out of the large number of new seedling varieties tested, 130 have remained free from leaf scald. Further tests must however be carried out. Most commercial varieties appear to be fairly resistant to chlorotic streak virus.

2874 Azab, Y. E. and Chilton, S. J. P.
Transmission of mosaic resistance to progenies in crosses between certain sugarcane varieties.
Phytopathology 1952 : **42** : p. 282. (Abst.).
The results of a study of seedlings from 175 crosses have led to the following hypothesis. Resistance to mosaic is dominant and depends upon complementary factors. A group of modifying factors affects the degree of resistance or susceptibility. Irregularities in the meiotic behaviour of the chromosomes of *S. spontaneum* also influence inheritance of mosaic resistance.

2875 Azab, Y. E. and Chilton, S. J. P.
Studies on inheritance of resistance to red rot disease of sugarcane.
Phytopathology 1952 : **42** : p. 282. (Abst.).
Data have been obtained which have led to the following hypothesis. Resistance to red rot (*Physalospora tucumanensis*) is determined by one or more genes for resistance from *Saccharum spontaneum* and a dominant inhibiting gene from *S. officinarum* which masks the effect of the genes for resistance from *S. spontaneum*. Minor modifying factors also influence reaction to red rot. The irregular chromosomal behaviour of sugar cane varieties during meiosis affects the ratio of resistant to susceptible plants in the progenies.

2876 **New cane varieties. 1952 distribution from experiment station.**
S. Afr. Sug. J. 1952 : **36** : p. 181.

Three sugar cane varieties developed from the cross Co. 421 x Co. 312 have been released to growers by the South African Sugar Association Experiment Station. N : Co. 339 produces heavy cane yields on a wide range of soils and maintains its ratooning properties very well; it is, however, susceptible to red rot. A high degree of red rot resistance is possessed by N : Co. 293, which is recommended for the Eshowe and Eston regions. N : Co. 291 also shows considerable resistance to red rot and is tolerant of mosaic; it grows vigorously on most soils and gives high cane yields characterized by the ease with which the trash falls away from the cane.

2877 **Annual Report of the Sugar Research Department of the Sugar Manufacturers' Association (of Jamaica) Limited 1950** : Pp. 41.

Tabulated data are presented on the performance of seedling selections introduced in successive years from the Central Sugar Cane Breeding Station, Barbados (cf. Abst. 1303). There is evidence that a few mosaic resistant varieties, particularly B 41227, B 42231 and B 4362, show sufficient promise in respect of juice quality and yielding ability to replace the two widely grown mosaic susceptible canes B 34104 and B 3439.

Under field conditions only 31 of the 50 parent canes now being used for breeding purposes proved resistant to the Jamaican form of mosaic when grown in plots surrounded by infected B 34104 canes.

2878 Ostenfeld, H. B.
Sugar-beet breeding in Denmark. Science helps to increase production.
Danish Foreign Office J. 1952 : No. 4 : 12–14.

Breeding methods used by the Sophiehøj Experiment Station and the Danish Sugar Company, are reviewed, with particular reference to the vigour shown by chemically induced polyploids and hybrids between selected inbred lines.

2879 Serbin, S. S.
(The response of sugar beet plants varying in respect of vigour to a high level nutrition).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 62–65. [Russian].

Biological differences between individual seeds of two, three and four germ sugar beet plants were investigated at the USSR Scientific Research Institute of Sugar Beet. It was found that seed which produced vigorous shoots gave plants which later responded better to fertilizers.

2880 Johnson, R. T.
The Spreckels Sugar Beet Breeding Program.
Spreckels Sug. Beet Bull. 1951 : **15** : 47, 50.

A cold chamber maintained at 38–44° F is being used by the Spreckels Sugar Company to induce earlier inflorescence production in selected beets which do not normally flower until winter in California; thus hybridization programmes can be accelerated.

Crosses between three of the Spreckels varieties and a male sterile strain developed by the US Department of Agriculture are reported; the latter produces single germ seeds. Analyses of the three hybrid progenies are in progress to determine the ability of the male sterile parent to transmit desirable characteristics.

From available commercial varieties several selections were made for ability to germinate rapidly at low temperatures; selections from S–2 showed most promise in this respect.

2881 Gaevskaja, I. G.
(Differences between plants grown from heterogeneous tissues of a sugar beet root).
Agrobiologija (Agrobiology) 1952 : No. 1 : 141–45. [Russian].

Experiments at the USSR Scientific Research Institute of Sugar Beet showed that material propagated vegetatively from different buds of the same individual differed genetically. A productive strain with a high sugar content has been developed from the variety VI–591. The method consisted of planting roots with the crowns removed.

2882 Popov, A. V.
(New methods of improving sugar beet varieties during the breeding process).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 7–14. [Russian].

Selection of sugar beet for woodiness which was found to be directly related to high sugar yield at the Jaltuškovskiĭ Breeding Centre, is discussed. A new variety, Ja 010 has been selected from KVP97. It is more productive

and has a 1·6% higher sugar content than M6ZZ, a variety previously unsurpassed in sugar content.

2883 Brewbaker, H. E., Bush, H. L., Nelson, R. T., Wood, R. R. and Oldemeyer, R. K.
Experiment Station briefs.
Through the Leaves, Colorado 1952 : **40** : 16–20.

Mention is made of a new variety of sugar beet, GW 359, which has a higher sugar content and greater resistance to low temperatures, leaf spot, *Fusarium* yellows and root rot than GW 304 (cf. Abst. 1307). It is being increased for release by the Great Western Sugar Experiment Station, Colo.
The establishment of a breeding programme using male sterile lines to produce commercially acceptable hybrid sugar beet is reported.

2884 Miège, J.
L'importance économique des ignames en Côte d'Ivoire. Répartition des cultures et principales variétés. (**The economic importance of yams in the Ivory Coast. The distribution of plantations and the main varieties**).
Rev. Bot. Appl. 1952 : **32** : 144–55.

The principal varieties of the two most widely grown species *Dioscorea alata* and *D. cayenensis* are described, including the varieties of the Bété Bété or Wété Wété and N'Za types of the latter species.
Vernacular names and equivalents are given and the uses of the different varieties are indicated.

STIMULANTS

2885 Grindrod, J.
Research in the field of tobacco cultivation and processing.
World Crops 1952 : **4** : 242—43.

A general review is given of research, including improvements due to selection, hybridization and mutation, reported during the World Tobacco Congress at Amsterdam in 1951.

2886 Coolhaas, C.
Large-scale use of F_1 hybrids in "Vorstenlanden" tobacco.
Euphytica, Wageningen 1952 : **1** : 3–9.

The results of breeding work on tobacco for the central part of Java, which were obtained before interruption by the second world war, are surveyed. The new strains introduced on a large scale were obtained by the following methods: (1) individual selection from old plantings of strains homozygous for most characters, resulting in the Kanari and other strains; (2) hybridization among true-breeding Vorstenlanden types followed by selection in the F_2 and succeeding generations; (3) hybridization of Vorstenlanden tobacco with the *Phytophthora* resistant strain Timor and subsequent back-crossing to Vorstenlanden, which produced the TV strains combining *Phytophthora* resistance with the good quality of the Vorstenlanden type; (4) X ray treatment of young flower buds, which induced the commercially valuable mutant Chlorina, with an exceptionally bright leaf colour; and (5) production of F_1 hybrids. The latter hybrids were produced to meet the requirements of diversity in market types. *Phytophthora* resistant TV tobacco was crossed with several other strains of different types. The commercial F_1 hybrids developed included some involving Chlorina; by using this mutant in hybrid combination its disadvantage of low number of leaves per plant could be overcome. It is emphasized that the F_1 hybrids were derived from closely related strains; their value depended upon the degree of dominance of good quality and other characters and not upon a heterotic effect. The extensive use of F_1 hybrids is recommended for tobacco production in Java to-day since seed of many selected strains formerly planted has been irretrievably lost.

2887 Bolsunov, I.
Quelques idées relatives à l'organisation d'une protection internationale des obtentions des sélectionneurs de tabac.
(**A few ideas concerning the organization of an international scheme for the protection of the products of tobacco breeders**).
Rev. Int. Tabacs 1951 : **26** : 228–31.

Proposals are formulated for an international system of patenting newly bred varieties of *Nicotiana Tabacum* and *N. rustica* (cf. Abst. 1312). Suggestions are also put forward for: (1) the organization of international comparative trials; (2) a programme of research on the genetics and breeding of tobacco; (3) the organization of scientific expeditions to countries from which *N. Tabacum* and *N. rustica* originally came, in order to collect wild forms and other breeding material from such centres of diversity; (4) the study of all tobaccos of economic value; and (5) the description of pure bred varieties.

2888 Fardy, A. and Hitier, H.
Observations sur les hybrides polygénomiques de *Nicotiana* et leurs descendants. (**Observations on polygenomic hybrids of *Nicotiana* and their descendants**).
CR Acad. Sci. Paris 1947 : **224** : 292–94.

A fairly fertile F_2 progeny with $2n = 111–118$ chromosomes has been obtained from the cross *N. rustica* x (amphidiploid *N. Bigelovii* x *N. glutinosa*). Other triple diploid hybrids failed to give diploid offspring though haploids were sometimes obtained parthenogenetically.
Hybrids have now been obtained combining the genomes of four or six *Nicotiana* species.
With regard to the offspring of the simple amphidiploids obtained by the authors (cf. Absts. 2127 and 2128), considerable differences between the various crosses were noted in the tendency towards meiotic stabilization in the later generations.

2889 Alcaraz Mira, E. and Izquierdo Tamayo, A.
La tetraploidía inducida por la colchicina en el género *Nicotiana*. (**Tetraploidy induced by colchicine in the genus *Nicotiana***).
Genet. Iber. 1950 : **2** : 295–322.

The most effective treatments were with a 0·2% colchicine solution, and tetraploid plants were obtained from several varieties of *N. Tabacum* and *N. rustica*. Their characteristics are described. A high degree of sterility and of meiotic irregularity was encountered, the irregularities being more pronounced in the *N. rustica* derivatives, where the chromosomes are larger than in those of *N. Tabacum*. The most fertile plants of the tetraploids of *N. rustica* produced up to 2400 seeds, as compared with 74,500 in the corresponding diploid. The 100 seed weight varied too; the seed of the plant with the highest seed weight was sown and gave rise to an F_1 in which the fertility was lower than that of the original tetraploids. Fertility rose again in the F_2, F_3 and F_4 when the plants with the highest 100 seed weight were used as parents. Also, in the *N. Tabacum* tetraploids, the fertility was lower in the F_1 and rose somewhat again in the F_2.
The *N. rustica* tetraploids were all higher than the diploid in nicotine content, which in some plants was as high as 8%, the maximum in the diploids being 4·6%. The average figures were 6·35 and 3·75% respectively.
The tetraploids seemed to thrive in rather colder conditions than those best suited to the diploids.

2890 Pogliaga, H. H.
Un nuevo caso de polihaploidía en "*Nicotiana Tabacum*". (**A new case of polyhaploidy in *N. Tabacum***).
Rev. Argent. Agron. 1951 : **18** : 221–30.

A haploid plant obtained in a cross of *N. Tabacum* x *N. otophora* flowered earlier than the hybrids from the same cross; morphologically it resembled the seed parent, though it was somewhat smaller. It proved completely sterile and highly irregular at meiosis, where the formation of bivalents and multivalents was frequently observed; as many as 14 chromosomes were sometimes associated, the association being closer than that ascribable to secondary pairing.

2891 Puzzilli, M.
Pressione osmotica nel genere *Nicotiana* in riferimento alla resistenza alla siccità. (**Osmotic pressure in the genus *Nicotiana* with reference to drought resistance**).
Tabacco 1952 : **56** : 110–22.

As an important factor in determining adaptation to environment, the osmotic pressure of six species of *Nicotiana* was estimated with a view to breeding drought resistant forms. In general the varieties of *N. Tabacum* showed higher maximum and average osmotic pressures than the other species and it is hoped by intraspecific hybridization in *N. Tabacum* to obtain hybrids combining drought resistance with a good quality of leaf.
Since the forms described as *N. Tabacum* var. *gigantea* and *N. gigantea* have almost the same osmotic pressure and resemble each other morphologically, they may, it is suggested, be regarded provisionally as one or at most as two different varieties of the same species, until cytological evidence decides the matter.

2892 Gisquet, P.
Obtention d'une lignée de *Nicotiana Tabacum* L., héréditairement stable, présentant le syndrome tératologique énation, réduit à ses manifestions foliaires. (**The production of an hereditarily stable line of *N. Tabacum* L. showing the teratological syndrome of enation reduced to its foliar manifestations**).
CR Acad. Sci. Paris 1948 : **226** : 832–33.

A morphological description is given of a tobacco line termed Énation 701, characterized by foliar enations; it arose from the cross Java-Isère x Cabot.

2893 Cuzin, J. L., Fardy, A. and Schwartz, D.
Étude anatomo-histologique de l'énation, syndrome tératologique héréditaire présenté par une lignée de *Nicotiana tabacum* L. (**An anatomohistological study of enation, an hereditary teratological syndrome shown by a line of *N. tabacum* L.**).
CR Acad. Sci. Paris 1947 : **224** : 1379–81.
An anatomical study is presented of the development of the leaf enations characteristic of line Énation 701 of *N. Tabacum* (cf. Abst. 2892).

2894 Fardy, A. and Hitier, H.
Hybrides triples haploïdes obtenus à partir de trois espèces de *Nicotiana* et transformation de ceux-ci en hybrides diploïdes par l'action de la colchicine. (**Triple haploid hybrids obtained from three species of *Nicotiana* and the transformation of these into diploid hybrids by means of colchicine**).
CR Acad. Sci. Paris 1944 : **219** : 594–96.
Colchicine-induced triple diploids have been obtained from the crosses (amphidiploid *N. glutinosa* x *N. sylvestris*) x *N. Tabacum* and (amphidiploid *N. Tabacum* x *N. glutinosa*) x *N. glauca.* The triple diploids are more fertile than the corresponding triple haploids, but meiotic irregularities are frequent.

2895 Rossi, U., Isaija, B. and Caracciolo, C.
La coltura e l'industria del tabacco in Italia. (**Tobacco cultivation and the tobacco industry in Italy.**)
Tabacco 1951 : **55** : 343–406.
This address to the World Tobacco Congress contains information on the early history of tobacco in Italy; the different kinds of tobacco manufactured in that country; and a table showing types and varieties grown and the yields obtained in 1950, with supplementary descriptive notes in which the genetic origin of some Italian and other tobaccos in cultivation in different parts of Italy are recorded.

2896 Puzzilli, M.
Osservazioni su alcuni tabacchi americani resistenti al mosaico ed al seccume concentrico e loro incrocio con linee nostrali var. V. bright. (**Observations on some American tobaccos resistant to mosaic and to wildfire and on the crossing of them with our lines of var. V. bright**).
Tabacco 1952 : **56** : 21–27.
Crosses have been made between the V. bright line Italia 7, which is resistant to black root rot and yields a tobacco of good quality, and (1) lines of the American interspecific hybrids Ky 52, Ky 56, Ky 151, Ky 160 and $Nna_1a_1a_2a_2$, which are resistant to mosaic, and (2) lines of the wildfire resistant TL 106. Similar crosses have been made by the Autonomous Tobacco Factory of the City of Castello, using the above mentioned American tobaccos, except Ky 160, with line 401 (N 5) of V. bright as the female parent. Line 401 produces a leaf of the best quality.
The F_1 from the above crosses will be studied with special reference to resistance to black root rot. It is hoped by further crossing and selection to obtain a combination of the best quality with disease resistance.

2897 Kelman, A.
Evaluation of resistance to *Pseudomonas solanacearum* in tobacco under greenhouse conditions.
Phytopathology 1952 : **42** : p. 284. (Abst.).
Root inoculation gave a more marked differentiation between resistant and susceptible varieties than stem inoculation. Of the Dixie Bright tobaccos tested, DB 102 showed the highest degree of resistance. A highly significant negative correlation was found between increase in height subsequent to inoculation and disease index. This correlation indicates the potential value of height measurements in supplementing disease readings in the evaluation of resistance to this disease.

2898 Nusbaum, C. J.
Host-parasite relations of *Phytophthora parasitica* var. *nicotianae* in roots of resistant and susceptible tobacco varieties.
Phytopathology 1952 : **42** : p. 286. (Abst.).
In young roots of the susceptible variety studied, Dixie Bright 402, the mycelium of *Ph. parasitica* reached the stele in 6 hours, the living cells through which the mycelium ramifies being depleted. In older lesions, all tissues, including the xylem, were invaded. In the resistant tobaccos Dixie Bright 101 and Dixie Bright 102, epidermal penetration was similar to that in susceptible plants. The epidermal cells were penetrated and adjacent cells collapsed, and the mycelium developed feebly in the tissues killed in advance of the invading hyphae. In most cases infection failed to pass the cortex.

2899 **Tobacco variety resists black shank disease in South Carolina tests.**
Crops and Soils 1952 : **4** : No. 8 : p. 28.
Oxford 1–181, a cigar wrapper variety resistant to black shank, has been released by the South Carolina Agricultural Experiment Station. It was derived from the same cross as Oxford 1, involving the black shank resistant 301 and Virginia Bright Leaf with numerous back crosses to the latter parent.

2900 VALLEAU, W. D.
Breeding tobacco for immunity to black shank.
Phytopathology 1952 : **42** : p. 288. (Abst.).
A suggested method of incorporating the black shank immunity of *Nicotiana longiflora* in *N. Tabacum* by back-crossing is outlined. By using for each generation a back cross parent resistant to mosaic, black root rot, wildfire and *Fusarium* wilt, it should be possible to combine resistance to all five diseases, provided the dominant factor for immunity from black shank can be eventually stabilized in a chromosome of *N. Tabacum*. Elimination of individuals susceptible to black shank could be accomplished by inoculating seedlings a few days old or vigorous young transplanted plants with swarm spores.

2901 STINSON, F. A.
Tobacco research in Southern Rhodesia.
World Crops 1952 : **4** : 234–36.
Research in progress at Trelawney, Karoi and Salisbury includes attempts to reduce the disease susceptibility of flue-cured tobaccos. Material resistant to root knot nematode has recently been incorporated in the breeding programme.
It has been noted that varieties with thick leaves tend to resist wildfire damage better than thin-leaved types.
Several imported strains which appeared promising in preliminary trials have been selected for selfing and back-crossing in order to confine desirable characters within a small number of widely adapted varieties.

2902 CLAUSEN, R. E.
The cytogenetics of introgression.
Science 1952 : **115** : p. 481. (Abst.).
If a chromosome-doubled form of *Nicotiana Tabacum* is crossed with diploid *N. glutinosa*, a relatively fertile triploid hybrid is produced. When the hybrid is selfed or back-crossed to *N. Tabacum* and selected for a specific character, such as necrotic resistance to mosaic, a segregate with a constitution of $24_{II} + 1_{I}$ is obtained, which, in addition to the complete diploid set of *N. Tabacum* chromosomes, retains the single alien chromosome, carrying the selected gene. Introgression of the alien gene into the *N. Tabacum* complex next occurs as a result of the occasional association of the alien chromosome with a specific *N. Tabacum* chromosome. The introgression may be effected by substitution of the whole of the alien chromosome or by segmental substitution.

2903 TERNOVSKIĬ, M. F. and TERENTJEVA, A. I.
(The selective fertilization capacity of tobacco for immune varieties).
Doklady Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **76** : 901–04. [Russian].
Investigations previously referred to (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2905) on selective fertilization in tobaccos, involving varieties susceptible to and immune from mosaic, powdery mildew and black root rot have been continued.
Experiments with several susceptible standard varieties pollinated with self pollen and pollen of one immune variety showed that they crossed more readily with the immune varieties. For instance, Trebizond 1272 preferred the pollen of Trebizond 295 and Trebizond 161 to self pollen, Trebizond 93 preferred the pollen of Trebizond 288, and Dubec 44 the pollen of Dubec 7, Dubec 353 and Dubec 566. The crosses Trebizond 1272 x self pollen + American 315 gave different percentages of hybrids depending on the time of pollination. The highest percentage of hybrids (81%) resulted from pollination three days before the flowers opened and the lowest (66%) from pollination one day before the opening of the flowers. Crosses effected on the same day as the flowers opened gave 76·6% hybrids.

2904 **New flue-cured strain a success despite unfavourable conditions.**
Rhod. Tobacco J. 1952 : **4** : No. 5 : 55–56.
Hicks, a new strain of flue-cured Virginia tobacco, has given good results in trials carried out on four farms in Southern Rhodesia.

2905 STINSON, F. A.
Results of experiments conducted at the tobacco research stations, 1949-1951.
Tobacco Research Board, Southern Rhodesia Bull. 1952 : No. 1 : Pp. 16.
A review of cultural practices recommended for production of flue-cured tobacco in Southern Rhodesia indicates varieties best suited to

conditions at the Trelawney and Karoi stations. Although several new varieties give high yields, many lack quality; Delcrest, however, has produced high quality leaf at both stations.

2906 VAN DER KNAAP, W. P.
Blister blight-resistente typen. (**Blister blight resistant types**).
Bergcultures 1952 : **21** : 205–07.

Among the tea clones undergoing selection for yield at the Pasir Saronggé estate, West Java, some have been found that are to some extent resistant to blister blight. Breeding for resistance should therefore be possible and planters are requested to search for resistant bushes from which progeny clones could be raised and tested for resistance.

2907 KRUG, C. A., CARVALHO, A. and MENDES, J. E. T.
Taxonomia de *Coffea arabica* L. III. *Coffea arabica* L. var *anormalis*. (**Taxonomy of *C. arabica* L. III. *C. arabica* L. var. *anormalis***).
Bragantia, S. Paulo 1950 : **10** : 336–43.

The plant described, characterized by the formation of several orthotropic branches instead of the normal lateral branches and various anomalies of development of leaves, flowers, fruits and seeds, proved to be a homozygous segregate for the gene *Am*, which is almost completely dominant to *am* and hence distinct from the recessive gene *anomala*.

2908 CARVALHO, A. and KRUG, C. A.
Genética de *Coffea*. XIII. Hereditariedade do caraterístico erecta em *Coffea arabica* L. (**Genetics of *Coffea*. XIII. Inheritance of the erecta character in *C. arabica* L.**).
Bragantia, S. Paulo 1950 : **10** : 321–28.

Several plants of the *erecta* type have been found in Brazil, though their origin is unknown. They all have the normal chromosome number $2n = 44$. Some of them, on selfing, gave *erecta* and normal plants in the proportions of 3 : 1, others bred true. Monohybrid segregation was also obtained in crosses with the normal and in backcrosses. The symbol *Er* is assigned to the character.

2909 KRUG, C. A. and ANTUNES FILHO, H.
Melhoramento do cafeeiro. III. Comparação entre progênies e híbridos da var. *bourbon*. (**Coffee breeding. III. Comparison between selfed progenies and hybrids of var. *bourbon***).
Bragantia, S. Paulo 1950 : **10** : 345–55.

Twenty-five plants of var. *Bourbon* selected for high yield were selfed and four of them were intercrossed in all possible combinations. The mean yields of the selfed and hybrid progenies over the first 12 years did not differ significantly; nor did the mean height, though the coefficient of variation was somewhat greater in the hybrids. None of the hybrid progenies individually exceeded the selfed progenies significantly in yield or height.

2910 NARASIMHASWAMY, R. L.
Leaf disease resistance and its importance in coffee.
Indian Coffee 1952 : **16** : 26–28.

Selections combining the good quality of *Coffea arabica* with a high degree of resistance to *Hemileia vastatrix* have been made from interspecific hybrids obtained at the Balehonnur Coffee Experimental Station, India, between *C. arabica* and *C. liberica*. S 288 and S 31 both outyield the *C. arabica* varieties Kent and Coorg but give up to 16% of triage. In an attempt to reduce the latter percentage, S 31 has been crossed with Kent; several improved selections have been obtained, including S 333 which yields an average of 7 cwt. per acre more than Kent. Clonal progenies are to be increased since seedling variability is too great.

2911 BOWMAN, G. F.
The problem of selection in cacao.
Cacao, Turrialba 1951 : **2** : Nos. 13–24 : 1–6.

The problems encountered in the selection of mother trees for clone production are discussed with reference to methods of preliminary selection before progeny testing which are recommended in the literature; some results obtained on the cacao farm of the Inter-American Institute of Agricultural Sciences, Costa Rica, are also analysed. The author emphasizes that the environment and early conditions of competition in the plantation may be as important in determining the yield of old trees as inheritance. Present programmes of selection may therefore be omitting promising material. Extensive search for morphological characters associated with high yielding ability is advocated.

2912 MACLEAN, J. A. R.
Oil-bearing seeds of possible economic importance to West Africa.
Nature, Lond. 1952 : **169** : 589–90.

The results of chemical analysis of the seeds of three *Herrania* spp., provisionally classified as *H. balaensis*, *H. Mariae* (sp. A) and *Herrania* (sp. B), are reported from the West African

Cacao Research Institute. The seeds may prove to be a source of edible oil. The highest oil content so far detected is 66·1% in a sample of *H. balaensis*.

2913 Schultes, R. E.
El género *Herrania* pariente silvestre del cacao cultivado. **(The genus *Herrania*, a wild relative of cultivated cacao).**
Agricultura Trop., Bogotá 1951 : **7** : No. 7 : 43–48.

A taxonomic review is given of the genus *Herrania*, and in particular, of its Colombian species.

2914 **Annual Report of the West African Cacao Research Institute, Tafo, Gold Coast, April, 1949 to March, 1950** (1951) : Pp. 84.

Further details are given of investigations concerning the susceptibility of West African Amelonado to the swollen shoot virus (cf. Abst. 1342). There is evidence that seedlings previously infected with a mild strain of virus 1A are less susceptible to artificial inoculations with a virulent strain of the same virus; tolerance, induced by the mild strain, has inhibited the spread of an epidemic of the more virulent strain occurring in control plots. Cacao from the Upper Amazon, Ecuador, again showed greatest resistance to infection by *Pseudococcus njalensis* carrying a mild strain of virus 1A. Progenies of Nanay x Nanay and reciprocal crosses between Nanay and Parinari and between Nanay and Iquitos proved very resistant to infection.

2915 Sosa-Bourdouil, C.
Sur le chimisme des étamines de pavot. Différences entre lignées fertiles et lignées steriles. **(On the chemistry of poppy stamens. Differences between fertile and sterile lines).**
CR Acad. Sci. Paris 1946 : **223** : 43–45.

Interspecific poppy hybrids showing various degrees of pollen sterility had a reduced content of nitrogen and phosphorus in the anthers in comparison with the parent species. The hybrids showed, however, no significant reduction in the content of sucrase. With respect to β-glucosidase, the content varied considerably between the pure species investigated, and in the cross *Papaver orientale* x *P. lateritium*, the higher content of the former species was inherited as a dominant character.

2916 Grümmer, G.
Beiträge zur Eigenschaftsanalyse der Anfälligkeit von *Papaver somniferum* gegen *Helminthosporium papaveris*. 2. Mitteilung. **(Contributions to the analysis of the character susceptibility to *H. papaveris* in *P. somniferum*. Part II).**
NachrBl. dtsch. PflSchDienst. 1952 : **6** : 32–36.

It is suggested that unimproved land varieties of *P. somniferum* should undergo selection to obtain varieties resistant to *H. Papaveris*.

2917 Fröier, K.
En fullträff. **(A bull's eye).**
Lantmannen, Stockholm 1952 : **36** : p. 328.

This is a note on the development of hop growing and breeding in Sweden at Näsum, the Balsgård Institute, and at various branch stations of the Swedish Seed Association. The strain 85 bred at Svalöf is mentioned for its quality, earliness, yield and the ease with which it can be plucked.

2918 Smiley, N. B.
Brewing trials of new variety hops —1949 crop.
J. Inst. Brew. 1952 : **49** : 183–84.

The results of commercial brewing trials of new hop varieties are summarized. FF 21 (Early Choice), DD 12 and WFG 19 are considered suitable for ales and stout as alternatives to Golding. Variety 170 A (Pride of Kent), although recommended for ales, imparted a hop flavour to stout which was possibly inferior to that contributed by Fuggles.

2919 Salmon, E. S.
"Norton Court Golding," a new hop.
Wye College, Kent 1952 : Pp. 4.

The new high yielding variety, formerly WFG 19, was developed at Wye College, Kent, from Canterbury Golding pollinated by a seedling (OB 21) raised from Brewer's Gold. Norton Court Golding has an easily controlled bine bearing large cones which grow in clusters, thus facilitating machine harvesting. It is less susceptible to downy mildew than other commercial Golding varieties and is immune from mosaic although it carries the mosaic virus. In brewing trials it has proved satisfactory, possessing excellent flavour and blending properties.

MINOR CROP PLANTS

2920 Boev, N. D. and Frolov, P. V.
(The results of state varietal trials of oil plants).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 34–41. [Russian].

Breeding work with different oil plants at various Soviet institutes, with references to varieties which were made standards in 1951 or gave a good account of themselves in the trials, is reported.

Camelina sativa. The productive varieties Voronežskiĭ 349 [Voronež 349], Voronežskiĭ 339, Kirgizskiĭ 1 [Kirgizian 1], VNIIMK* 17 and Šortandinskiĭ [Šortand] have been made standards.

Oil poppy. Altaec [Altaĭ], Barnauljskiĭ 490 [Barnaul 490], Voronežskiĭ 1042 [Voronež 1042], Tatarstan 1 and Čišminskiĭ 171 have been made standards. These varieties are remarkable for their high yields and oil contents.

Rape. Local varieties and three cultivated winter and two cultivated spring varieties are under trial. Four local rapes have been made standards. The objective is to obtain hardy varieties.

Mustard. Breeding has been conducted at the Stalingrad State Breeding Station and at the former Branch Station of VNIIMK near Moscow. Three varieties of blue and two varieties of white mustard, including Neosypajuščajasja 2 [Nonshedding 2], bred at Stalingrad, and VNIIMK 162 have been made standards. Neosypajuščajasja 2 is more productive and has a 65% higher oil content than other blue mustards in many regions of the USSR. It is tall, suitable for combine harvesting and shows resistance to lodging and shedding. VNIIMK 162 is 5–8 days earlier than Neosypajuščajasja 2.

Sesame. VNIIMK 81, an early variety tolerant of drought, Kubanec 55 [Kubanj 55], remarkable for its high yield and resistance to bacteria, and Odesskiĭ 539 [Odessa 539], have been made standards in the northern Caucasus and the Ukraine, Taškentskiĭ 122 [Taškent 122], a productive variety with a high oil content, in the central Asiatic republics and Azerbaĭdžan, and Sarahskiĭ 470 and Belosemjannyĭ 7 [White-seeded 7] in Turkmenia.

Castor oil plant. Sanguineus 401, Sanguineus 98, Kruglik 5, Sanguineus Sintetičeskiĭ [Synthetic Sanguineus], Donskaja 172/1 [Don 172/1] and Taškentskaja 351 [Taškent 351] have been made standards. Sanguineus 401, bred at VNIIMK, outyields Kruglik 5 and Donskaja 172/1 by 2·5–3 c. per ha. and has a 3–4% higher oil content under the conditions of the northern Caucasus. It shows resistance to grey bacterial rot and shedding and can be harvested mechanically. Sanguineus Sintetičeskiĭ, which has been made a standard in the Rostov province, has similar economic properties. Kruglik 5 is more productive and has a higher oil content than Donskoĭ 172/1 under Ukrainian conditions. In Central Asia, Sanguineus 98 yields 4–5 c. seed more per ha. than the varieties susceptible to shedding and has a 3–4% higher oil content.

Lallemantia. Five varieties were tested, and Donskaja 2 [Don 2] and Donskaja 24, bred at the Don Research Station of Oil Plants, have been made standards. All varieties, including the new standards, show lack of vigour and susceptibility to diseases and shedding and are unsuitable for combine harvesting.

Linseed. The new standards include Buharskiĭ 32 [Buhara 32], bred at the Miljutino State Breeding Station, and Gissarskiĭ 474, developed at the Tadžik State Breeding Station, which show resistance to drought, Voronežskiĭ 1308 [Voronež 1308], VIR† 1650, Stepnoĭ 265 [Steppe 265], Sibirjak [Siberian] and VNIIMK 5237, a productive variety. Voronežskiĭ 1309, VIR 1650 and Sibirjak are productive dual purpose types, VIR 1650 is remarkable for its resistance to drought and Sibirjak for its early maturity.

Perilla. Novinka [Novelty], Seraja Hozjaĭstvennaja [Grey Industrial] and Amurskaja Mestnaja [Local Amur] have been made standards in the Soviet Far East and Ukrainskaja 30 [Ukrainian 30] a standard in the Ukraine.

Sunflower. Of the 46 varieties tested, 23, including the following, have been made standards: VNIIMK 1646 and VNIIMK 6540 in the northern Caucasus, the Ukraine and Moldavia, Černjanka 11, Černjanka 35 and Zelenka 63 [Green 63] in the central black-earth provinces, Saratovskiĭ 10 [Saratov 10], VNIIMK 4036 and VNIIMK 4966 in the Povolžje, and Šortandinskiĭ 41 [Šortand 41] in Siberia and Kazahstan.

VNIIMK 1646 and VNIIMK 6540 are superior to Ždanovskiĭ 8281 on account of their high oil contents. VNIIMK 6540 shows resistance to

* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].
† Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

Orobanche, Černjanka 11 and Černjanka 35, bred at Voronež, are remarkable for their productiveness and Zelenka 63, developed at the Veĭdeleevskoe Field Research Station, for its high degree of resistance to *Orobanche*.
Saratovskiĭ 10 has a 4–5% higher oil content than Saratovskiĭ 169. VNIIMK 4036 and VNIIMK 4966 have higher oil contents and are more productive than Saratovskiĭ 169.

Safflower. Miljutinskiĭ 114 [Miljutino 114] has been made a standard. In the trials it yielded 1·5 c. more per ha. and had a 2–2·5% higher oil content than other varieties. It has large seed heads and low husk content and is suitable for combine harvesting.

Arachis. Perzuvan 46/2 and Taškentskiĭ 112 [Taškent 112] are regarded as the best standards for central Asia and Transcaucasia, and Stepnjak [Steppe], Adyg and VNIIMK 1657 for the northern Caucasus and the Ukraine. Perzuvan 46/2, bred at the Azerbaĭdžan Research Station of Oil Plants, is more productive and has higher oil and protein contents than other varieties. It produces large pods of good quality. Taškentskiĭ 112, developed at the Central Asiatic Research Station of the USSR Institute of Plant Industry, is 2–3 days earlier but less productive than Perzuvan 46/2. It yields good quality pods. Stepnjak and VNIIMK 1657 are early, productive and show resistance to diseases. VNIIMK 1657 produces larger pods than Stepnjak. Adyg is a new productive variety with large pods. It was bred at the USSR Scientific Research Institute of Oil Plants.

2921 Dutt, M.
Mercuric chloride as chromosome fixative for oily material.
Stain Tech. 1952 : **27** : 121–22.

The use of mercuric chloride as a fixative for pollen mother cells of *Jasminum calophyllum* ($2n = 52$) is described.

2922 Andersson, G.
Svalöfs Gute vårrybs. (**The Svalöf spring turnip rape Gute**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 9–15.

This variety, put on the market in 1951 and bred by the Swedish Seed Association, is a mixed F_1 population comprising five strains Sv 0300 and Sv 0302–Sv 0305. The object in using such a population was to obtain a higher yield of seed as a result of heterosis, and to ensure a wider adaptation to different conditions of climate and soil. The value of using F_1 mixed populations has not yet been fully tested. During 1947–51 Gute was tested in 28 trials on mineral soils and in 33 on humus. In seed yield, it surpassed Sv 0300, a mass selection from a German variety, by 4% on mineral soils and by 9% on humus. In oil content, Gute and Sv 0300 were equal on mineral soil but on humus Gute was the better by 0·7%. Gute ripened on the same day as Sv 0300 on humus, and one day later on mineral soil; the corresponding figures for Fenno were 7 and 5 days later than Gute, and for Regina 23 and 14 days later.
Morphologically, Gute and Sv 0300 are indistinguishable. On a 10-point grading for stiffness of stalk (1 = complete lodging), Sv 0300 was rated 6·2, Regina 6·5 and Gute 7·5.

2923 Hérisset, A.
Une nouvelle variété de ricin; son importance économique. (**A new variety of the castor oil plant; its economic importance**).
CR Acad. Sci. Paris 1947 : **224** : 1836–38.

A variety is described yielding 1600–2000 kg. of beans per ha. at Anjou, and giving an oil with satisfactory industrial qualities.

2924 Blaringhem, L.
Rectification à la note de M. Armand Hérisset: Une nouvelle variété de ricin; son importance économique. (**Rectification of the note from M. Armand Hérisset: Une nouvelle variété de ricin; son importance économique**).
CR Acad. Sci. Paris 1947 : **225** : p. 325.

The paper cited above (cf. Abst. 2923) is criticized on the grounds that the variety described has not been shown to be definitely fixed, and that the procedure suggested by the author for inactivating ricin requires further safeguards.

2925 Hérisset, A.
Addition à la note: Une [nouvelle] variété de ricin; son importance économique. (**Addition to the note: Une [nouvelle] variété de ricin; son importance économique**).
CR Acad. Sci. Paris 1947 : **225** : 692–93.

In reply to criticisms by Blaringhem (cf. Abst. 2924) the author states that he claims no more than that the castor oil plant variety under discussion has remained stable for five years. The procedure described for inactivating ricin is declared to be satisfactory.

2926 **Two new castor bean varieties.**
Seed World 1952 : **70** : No. 7 : p. 52.

Advances in castor bean breeding in the USA are surveyed, with reference to the discovery of

male sterile lines in Nebraska which may be used to develop commercial hybrids; the few hybrids already tested have given outstanding yields. The recently released varieties US 74 and Cimarron are mentioned (cf. Abst. 2927).

2927 **USDA releases two new castor bean varieties.**
Sth. Seedsman 1952 : **15** : No. 4 : p. 63.
Improved yields of castor oil are obtained from USDA 74 (cf. Abst. 2156) and Cimarron, developed for conditions in Texas and Oklahoma. Both varieties are harvested by machine more readily than older varieties such as Conner.

2928 Burdick, A. B., Wiser, W. J. and Ford, R. F.
Castor bean yield trials 1942, 1950, 1951.
Mim. Ser. Ark. Agric. Exp. Sta. 1952 : No. 9 : Pp. 8.
The results of castor bean variety trials in Arkansas are given. Conner is recommended for cultivation in this state. Some new strains showed promise in the 1951 test.

2929 André, E.
Le tournesol ou "Grand soleil" (*Helianthus annuus* L.), plante oléagineuse. [**The sunflower (*H. annuus*), an oil plant**].
Oléagineux Rev. Gén. Corps Gras Dérivés 1952 : **7** : 127–34.
The first part of this article deals with the botanical features of the sunflower, its inflorescence and seeds, its history, and the varieties grown in the Ukraine and in France. Results obtained by breeding in the Ukraine are mentioned with comments on the uses and qualities of different kinds of sunflowers, including the black dwarf type of unknown origin.
The School of Agriculture at Montpellier, France, has isolated a variety 39, which is unbranched and has striped seeds (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1828). The variety Giant hybrid Saint-Reverend [sic] was bred at Saint-Genis-de-Saintonge Experimental Farm.

2930 Ustinova, E. I. and Nesterova, T. T.
(**The development of the sunflower embryo following different methods of pollination**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 11 : 14–22. [Russian].
At the Agrobiological Station of the Moscow State University the embryos and endosperms of Saratovskiĭ 169 [Saratov 169] developed better when the variety was pollinated with large amounts of pollen, either self pollen or self pollen + Černjanka 35, than with small amounts of pollen. The material obtained from pollination with a large amount was healthier and more uniform. Inbreeding had a deleterious effect upon Saratovskiĭ 169. This was associated with a gradual destruction of the embryo sac in the absence of fertilization with foreign pollen.

2931 Heiser, C. B. (Jun.).
The sunflower among the North American Indians.
Proc. Amer. Phil. Soc. 1951 : **95** : 432–48.
A comprehensive account is given of the use of the wild sunflower in the past; the early distribution of the cultivated sunflower; the introduction of the sunflower into Europe; modern sunflower varieties; and American Indian varieties of the cultivated crop. The author has grown and studied varieties from the Seneca, Arikara, Hopi, Havasupai and Mexican Indians. The interrelationships of these varieties are discussed. The Arikara type possesses several characteristics which are regarded as primitive for the cultivated sunflower, and possibly it resembles the earliest cultivated varieties. Its apparently primitive features may however have resulted from hybridization with wild sunflowers.

2932 Ufer, M.
Der Einfluss der Juni-Nachtfröste 1949 im Kabulgebiet (Afghanistan) auf Kultur-Sonnenblumen. [**The effect of the June night frosts of 1949 in the region of Kabul (Afghanistan) on cultivated sunflowers**].
Z. Pflanzenz. 1952 : **31** : 218–25.
As a preliminary to an attempt to introduce the cultivated sunflower into Kabul, it was found necessary to study the effects of night frosts on the plant. Experiments showed that crops, raised in Afghanistan from seed of Russian provenance, exhibited branching of the stem and other anomalies affecting the flowers, leaves, petioles and internodes, but not the seeds. Progenies raised under conditions of open pollination from aberrant mother plants showed similar abnormalities. The phenomenon is provisionally attributed to the effect of the sharp changes in temperature characteristic of the district and it is suggested than non-Mendelian mutations of a plasmogenic nature

may be the cause, and that there may be labile races of sunflower which are specially sensitive to temperatures such as prevail in Kabul.

2933 McGregor, W. G. and Hay, W. D.
Safflower—Canadian experiments.
Sci. Agric. 1952 : **32** : 204–13.

Some 26 lines of *Carthamus tinctorius* introduced from India and the USA have been undergoing yield trials since 1936 in six provinces. Highest yields in the past five years were obtained at Lethbridge, Alta., where Type 1 from Montana outyielded other varieties; Pusa 2 matured earliest and contained 27·2% oil. There is evidence that improved resistance to rust, bud rot, leaf spot and root rot could be developed by selection and hybridization.

2934 Thomas, C. A.
A greenhouse method of evaluating resistance in safflower to *Phytophthora* root rot.
Phytopathology 1952 : **42** : 219–21.

Resistant and susceptible varieties of *Carthamus tinctorius* have been successfully differentiated by pouring a mycelial suspension of *Ph. Drechsleri* on the surface of soil in which 1–2 weeks old seedlings are growing; in this manner the seedlings remain undisturbed. When maintained at 25–30° C for six weeks susceptible individuals are killed; results agree with field observations in southern California and the Great Plains.

2935 Henry, P.
La germination des grains d'*Elaeis*. (**Germination of seeds of *Elaeis***).
Rev. Bot. Appl. 1951 : **31** : 575–91; 1952 : **32** : 66–77.

This monograph, based on research at the Institute of Research on Oils and Oil-bearing Plants, at Pobé, Dahomey, deals with: the botanical and anatomical description of the seed; differences between the various *dura, tenera* and *pisifera* types; the internal and external conditions affecting germination, and variations and irregularities that may occur; induced and natural germination; and practical aspects of raising seedlings.

2936 Xabregas, J.
A produção do óleo de palma e a Estação de Investigação da Palmeira na Nigéria. (**Production of palm oil and the Oil Palm Research Station in Nigeria**).
Agron. Angol. 1951 : No. 5 : 95–109.

The article contains an account in Portuguese of the work of the station (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2003).

2937 Chevalier, E.
Étude caryologique de cinq espèces australiennes d'*Acacia*. (**Caryological study of five Australian species of *Acacia***).
Rev. Cytol. Cytophysiol. Vég. 1945 : **8** : 77–86.

Descriptions are given of the resting and dividing nuclei of *A. calamifolia, A. rubida, A. cultriformis, A. retinoides* and *A. verticillata*. All these species have $2n = 26$ chromosomes; four were polysomatic with tetraploid cells present in the root periblem.

2938 Reinach, O.
Sur la culture des *Strophanthus* en Afrique. Réflexions générales. (**On the cultivation of *Strophanthus* spp. in Africa. General reflexions**).
Rev. Bot. Appl. 1952 : **32** : 163–68.

A number of species are being raised for seed at Akoudié and artificial crosses will be made to obtain a hybrid with a high content of sarmentocymarin.
Mention is also made of the work of Reichstein on the sarmentocymarin content of various species; of explorations in the African dependencies of France to discover one with a high content; of the difficulties of artificial crossing; and of the possibilities of shortening the number of years required for the raising of hybrid seedlings.

2939 Ebes, K.
Verbetering van de stamvorm door selectie. (**The improvement of stem form by breeding**).
Ned. BoschbTijdschr. 1951 : **22** : 1–7.

Early work on cinchona selection and breeding in Java is described. The original aim was to increase the quinine content, but at the same time marked variation in stem form was observed. Some clones, descended from seedlings from the original *Cinchona Ledgeriana* parents dating from 1864, are characterized by superior stem form. Selection of parent trees of the type desired, followed by vegetative multiplication, subsequent crossing in a seed garden, and selection in the F_1, is recommended as a method of further improving stem form and other features in cinchona and possibly also in other species of trees.

2940 Love, H. T., Cowgill, W. H. and Hopp, H.
Variability and estimation of the quinine content of *Cinchona* clones.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 109–14.

An analysis of bark from 46 clonal populations in Guatemala by means of plug sampling and fluorometric assay revealed marked differences in quinine content between and within populations. A formula is given for estimating the quinine content of a whole population from random samples of individual trees.

2941 Potuljnickiĭ, P. M.
(**The origin of unproductive *Taraxacum* spp. occurring as impurities in kok saghyz**).
Agrobiologija (Agrobiology) 1952 : No. 2 : 45–54. [Russian].

Various theories of the origin of *T. brevicorniculatum* and *T. Martii*, which occur as weeds in fields of *T. Kok-saghyz* in the Ukraine, are discussed, including a Mičurinite hypothesis that they have arisen from the cultivated species.

2942 Nej.
Nové formy kok-sagyzu. (**New forms of kok saghyz**).
Zpravodaj Ústředí Zeměd. Výzkumníků 1952 : **2** : p. 24.

New forms of kok saghyz, with high rubber contents and large roots and adapted to local conditions, have been developed at the Kazah Field Research Station of the USSR Scientific Research Institute of Rubber Plants.

2943 Sharp, C. C. T.
Progress of breeding investigations with *Hevea brasiliensis*, II. The crosses made in the years 1937-1941.
Rubb. Res. Inst. Commun. Malaya **13** : No. 272 : 73–99.

The characteristics of families originating from hand pollination carried out during the period 1937 to 1941 are surveyed. Parent clones which would probably give the best results in fields of mixed clones planted for seed production comprise Tjirandji 1, Avros 157, Lun. N, RRI 501 and RRI 509. On the basis of experimental results, inclusion of two closely related clones in seed gardens is not advocated. Thirty-one clones (RRI 600–630) selected from those propagated from the hand-pollinated seedlings are undergoing large scale tests.

FRUITS AND NUTS

2944 Brooks, R. M. and Olmo, H. P.
Register of new fruit and nut varieties. List 6.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 386–407.

A descriptive list is given of commercial varieties of fruits and nuts developed in the USA and Canada.

2945 **Award for a Michurinist.**
Agric. News, Hungary 1952 : No. 13 : 2–3. (Mimeographed).

New types of wild strawberry, raspberry and mulberry-strawberry are reported to have been developed by A. Porpáczy at the Fertód Agricultural Experiment Station, using Mičurin-Lysenko principles.

2946 Granhall, I.
Fruktträdsförädling vid Balsgård (**Fruit tree breeding at Balsgård**).
Årsb. Svensk. Jordbr. Forsk. 1952 : 132–39.

The establishment and development of the Balsgård Plant Breeding Institute in Sweden are described, with notes on its large-scale programme for the improvement of apples, pears, plums, cherries and hazel by hybridization and selection (cf. Absts. 652, 653 and 658). Cytological studies are also carried out in connexion with hybridization, induced polyploidy and mutation, and embryo culture is being used in the research on cherries (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2095).

2947 Passecker, F.
Untersuchungen über die Befruchtungsbiologie von Tiroler Obstsorten. (**Investigations on the biology of fertilization of Tyrolese fruit varieties**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1952 : **2** : 111–18.

The results tabulated in this paper complete a study by the author and other investigators on compatibility and suitable pollinators for different varieties of apple, plum, damson and cherry grown in the northern Tyrol.

2948 Leinjš, P. Ja. [Lejiņš, P.] and Peĭve, Ja. V. [Peive, J.].
(**The outlines of the scientific research programme of the Academy of Sciences of the Latvian SSR for the year 1951**).
Latv. PSR Zinātņu Akad. Vēstis 1951 : No. 1 (42) : 23–34. [Russian].

The tasks of the Institute of Soil Science and

Agriculture include breeding fruits and vegetables for hardiness. At the Institute of Microbiology, morphological and biological changes in microorganisms are being investigated in the light of the research by Lepešinskaja (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1509).

2949 Einset, J. and Lamb, B.
Chromosome numbers of apple varieties and Sports III.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 103–08.

A further report of chromosome numbers of apple varieties and sports in the collection at the New York State Agricultural Experiment Station is given (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 477 and Vol. XXI, Abst. 569). The material studied was from many sources. It included Polish and Russian varieties obtained in the 'thirties, cider apples and large-fruited sports. The latter, including sports of Jonathan and McIntosh, represent types of diploid-tetraploid periclinal chimeras, differing in the relative amounts of diploid and tetraploid tissue.

2950 **Two new apple varieties.**
Amer. Fruit Gr. 1952 : **72** : No. 6 : p. 20.

Ozark Ruby, from the Ozark Nursery, Tahlequah, Okla., is considered to be worth extensive testing as a result of trials at the Oklahoma Agricultural Experiment Station. The variety is similar to Ada Red and Jonathan, except that it is without the flavour of Jonathan; it appears to be an annual bearer. Franklin, developed from a cross between McIntosh and Delicious and introduced in 1938 by the Ohio Experiment Station, is described as outstanding for its good quality and attractive appearance.

2951 Howlett, F. S. and Fowler, T. E.
Franklin apple is receiving favorable consumer comment.
Ohio Fm. Home Res. 1952 : **37** : 9–11.

Franklin (McIntosh x Delicious), introduced by the Ohio Experiment Station in 1938 for trial, shows promise as a dessert and cooking apple. No other variety studied at the station has equalled Franklin in its capacity to give good crops each season. It has the defects of susceptibility to scab, and also to scald as a result of storage at 32–36° F. In yield and appearance it has exceeded both parents.

2952 **Cherry and apple breeding work at Bathurst.**
Agric. Gaz. N.S.W. 1952 : **63** : p. 131.

In cherry breeding for canker resistance at the Bathurst Experiment Farm, NSW, crosses of the resistant East Malling stock F 12/1 and two unnamed varieties with the susceptible dessert varieties St. Margaret, Ron's, Florence and Early Lyons have been obtained. Apple hybrids highly resistant to black spot have been crossed with Jonathan in the hope of further improving their quality while retaining their disease resistance.

2953 Gagnieu, A.
Production de pollen chez le pommier: possibilité de léthalité génique monofactorielle. (**Pollen production in the apple: possibility of monofactorial genic lethality**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : 455–96.

Out of 272 varieties of apples examined, 261 showed pollen viability values indicating regular meiosis. Most of the diploids showed normal meiosis and good pollen, but a few diploids and the triploid varieties had bad pollen with irregular meiosis.

A lethal gene may, it is thought, account for the fact that, in ten diploid varieties, 50% of normal and 50% of abnormal pollen were observed, though meiosis was regular. The segregation suggested simple disomic inheritance of four different genes provisionally termed p_1, p_2, p_3 and p_4 which may or may not belong to an allelomorphic series. Cytological evidence was found to support the author's view that secondary pairing is not general in diploid apples.

2954 Carlone, R.
Rome Beauty, Morella ed Imperatore. (**Rome Beauty, Morella and Imperatore**).
Ital. Agric. 1952 : **89** : 397–407.

These three apple varieties, which are described, are almost identical in all respects except certain details of the fruits. All are self sterile and on intercrossing they proved intersterile; it is concluded that the varieties Morella and Imperatore [Emperor] arose from Rome Beauty by bud mutation.

2955 Dermen, H.
A tetraploid sport of delicious apple from Idaho.
J. Hered. 1952 : **43** : p. 8.

A sport of Delicious has been found to be tetraploid except for a diploid epidermis, and will be used in breeding at the Bureau of Plant Industry, Beltsville, Md. A tetraploid sport of the English apple Fertility, normally self sterile, has been found to be self fertile.

2956 Zavackaja, E. A.
(Selective fertilization of the apple Pepin Šafrannyĭ).
Agrobiologija (Agrobiology) 1952 : No. 2 : 122–28. [Russian].

At Mičurinsk, Pepin Šafrannyĭ [Saffron Pippin] set and developed more fruits and produced more seed per fruit, when open-pollinated or pollinated with mixed pollen of the same variety grown in different localities than when pollinated with single pollen samples originating from the Crimea, Krasnodar territory or Voronež province. However, the fruits resulting from pollination with Crimean pollen contained most seed.

2957 Panasjuk, M. I.
(Natural wines from apples with a high sugar content).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. 1 : 24–25. [Russian].

Hybrids recently developed at Mleev, Ukraine, included the productive, sweet, small-fruited apples 21805, from Genzengeĭmskoe Avgustovskoe [August Gänsenheim] x a seedling obtained by open pollination, 18308 from Taftjanoe [Taffeta] x mixed pollen, and 16053, from Winter Golden Pearmain x Pulcella. The fruits of the hybrids had a high sugar content and their juice gave good material for making wine.

2958 Dermen, H.
Polyploidy in the apple found seven years after colchicine treatment.
J. Hered. 1952 : **43** : 7–8.

Branches consisting of tetraploid tissue except for diploid epidermis and outer cortex have been identified in a McIntosh tree fruiting for the first time in 1949 after colchicine treatment in 1942. In the case of the apple, leaf characters do not form a satisfactory means of recognizing polyploidy prior to fruiting. Polyploidy is most readily detected by three fruit characters: increase in size, flattened shape and irregularity of contour.

2959 **Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1950.**
Dep. Sci. Indust. Res. 1952 : Pp. 43.

Details are given on the storage behaviour of 22 English varieties of dessert apple at the Ditton Laboratory, East Malling (cf. Abst. 664). Tydeman's Late Orange, Winston, Barnack Beauty, Belle de Boscoop and D'Arcy Spice kept in good condition until March at 37° F. At 32° F Barnack Beauty and Belle de Boscoop showed degeneration; although the other three stored equally well at both temperatures there is no great advantage in keeping them at 32° F. A slight loss of ascorbic acid occurred during storage of all five varieties; Belle de Boscoop, a triploid variety, has a much higher ascorbic acid content than the rest.

2960 Banta, E. S.
Scab-resistant apples.
Amer. Fruit Gr. 1952 : **72** : No. 5 : p. 18.

Progress in breeding scab resistant apples in the USA is briefly described. Crab apples forming valuable sources of resistance include *Malus atrosanguinea*, *M. floribunda* and *M. Zumi* var. *calocarpa*. Among the seedlings showing particular promise are those from a cross between Wealthy and a Russian seedling and from Jonathan x (Rome Beauty x *Malus floribunda*).

2961 Shay, J. R. and Hough, L. F.
Evaluation of apple scab resistance in selections of *Malus*.
Amer. J. Bot. 1952 : **39** : 288–97.

Thirty species and varieties of *Malus* have shown a high degree of resistance to infection by single spore cultures of seven isolates of *Venturia inaequalis* in greenhouse tests at Lafayette, Ind., and in field tests at ten centres in the USA, from 1947 to 1950. No evidence was obtained to indicate the existence of physiological strains of the pathogen. Hybridization is under way to combine the resistance of these clones with the fruit size and quality of scab susceptible commerical varieties.

2962 Boyes, W. W., Ginsburg, L. and de Villiers, D. J. R.
The keeping qualities of apricots in cold storage.
Fmg. S. Afr. 1952 : **27** : 68–72.

At the Western Province Fruit Research Station, Stellenbosch, the varieties Royal and Bulida developed internal breakdown when stored for 3 weeks at 31° F and ripened at 50° F; Bulida fruits became brown, pulpy and useless, but Royal fruits could be used for stewing, particularly if stored while still green. The high fruit quality of Alpha apricot was maintained after similar storage and this variety is therefore recommended for export.

2963 Blaringhem, L.
Descendance singulière du cerisier à fleurs doubles *Cerasus avium* L. f. *plena* C. K. Schneider. **(Unusual progeny of the double-flowered cherry, *C. avium* L. f. *plena* C. K. Schneider).**
CR Acad. Sci. Paris 1948 : **227** : 799–802.

A plant with the characteristics of *Prunus*

Cerasus and only a slight tendency to produce double flowers has been reared from a fruit of a tree of *C. avium* f. *plena* formerly growing at Meudon.

2964 Monin, A.
Description et identification des variétés de cerisiers. (**Description and identification of varieties of cherries**).
Bull. Inst. Agron. Gembloux 1951 : **19** : 276–326.

As a preliminary step to the improvement of the cherries in cultivation in Belgium, where at present the nomenclature of the 200–300 varieties grown is in considerable confusion, a thorough study of their identity is essential. The author therefore enumerates useful diagnostic characters (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1396) and gives a systematic classification of the principal varieties based on an examination of the fruit.

2965 French, A. P.
The peach. Inheritance of time of ripening and other economic characters.
Bull. Mass. Agric. Exp. Sta. 1951 : No. 462 : Pp. 31.

The basis of inheritance of time of ripening was found to be polygenic. Champion however probably also possesses a major gene for earliness, and Gold Drop and some other late varieties apparently also have a major gene for lateness. In general, the means of hybrids from crosses of varieties having different seasons of maturity indicate partial dominance or no dominance for early or late maturity. In two hybrid progenies evidence of factor interaction for delayed maturity was obtained; in another hybrid, factor interaction for early maturity probably occurred. The variability of the hybrid progenies depended on the type of gene action in the parents. Stringiness and coarseness of flesh both appeared to be recessive characters in general. Stone size and juiciness are probably controlled by polygenes; whether or not any phenotypic dominance in either character was expressed depended on the cross. In a study of skin thickness, it was found that Belle transmitted the character of thin skin to its selfed progenies and Elberta thick skin. The tender skin of Belle appeared to be completely dominant over the medium tough skin of Champion. With the exception of time of ripening, the characters studied were substantially influenced by the environment; for this reason it is pointed out that the results are in most cases only of tentative value. The probable usefulness of the different varieties in breeding for economic characters is indicated.

2966 Gehbauer, F.
Volkswirtschaft und Pflanzenzüchtung. I, II. (**National economy and plant breeding. Parts I and II**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1952 : **2** : 68–71, 107–09.

In part I mention is made of the genetic basis of pubescence in the peach and of the production by hybridization of satisfactory nectarine varieties. Part II refers to the suitability of *Prunus* (*Amygdalus*) *Fenzliana* as a pollinator for the almond tree; mixtures of pollen from several varieties of almond were also found effective. The future aim in breeding almond trees should be to produce a sweet almond with the thinnest possible shell.

2967 Carrante, V. and Bóttari, V.
Miglioramento genetico del limone e ricerca di varietà resistenti al "mal secco". (**Genetic improvement of the lemon tree and the search for varieties resistant to "mal secco"**).
Ann. Sper. Agrar., Roma 1952 : **6** : 323–46.

With a view to breeding varieties of lemon combining high resistance to mal secco with wide adaptation to environmental conditions and the various technical and economic measures incidental to the uses for which the fruit is intended, varietal and interspecific crosses involving 8 species were carried out in several localities in Italy. The number of flowers pollinated, the set of seeds and incidence of polyembryony are recorded.
The following provisional conclusions were reached: (1) hybrids with marked resistance to *Deuterophoma tracheiphila* can be obtained provided one parent is resistant; (2) from the nucellar progeny of resistant varieties, e.g. Monachello, plants combining resistance with vegetative vigour and a yield superior to that of the parent can be obtained; and (3) the nucellar progeny of susceptible varieties, e.g. Femminello, is unlikely to comprise resistant plants unless mutation occurs in the nucellar embryo.

2968 Russo, F. and Torrisi, M.
Il poliploidismo nei *Citrus*. Autopoliploidi ed allopoliploidi. (**Polyploidy in *Citrus* species. Autopolyploids and allopolyploids**).
Ann. Sper. Agrar., Roma 1951 : **5** : 1041–62.

Various types of polyploids in citrus crosses made at the Experimental Station for Fruit and Citrus Cultivation, Acireale (Sicily) are described. The types of tetraploids are discussed with special reference to allotetraploids of a kind not described before. These allotetraploids exhibited some of the morphological features of the pollen parent and also very vigorous growth; their origin and their use for obtaining triploids with a chromosome complement derived from three species are considered.

2969 Dutta, S. and Bhattacharya, S. C.
A new citrus species of Assam. *Citrus assamensis* Dutta and Bhattacharya, sp. nov.
Indian J. Hort. 1951 : **8** : No. 3 : 1–5.

A new species, *C. assamensis*, is described. It shows some similarity to *C. Hystrix*.

2970 Maĭsuradze, N. I.
(**Some results in breeding oranges**).
Agrobiologija (Agrobiology) 1952 : No. 1 : 69–78. [Russian].

Interspecific hybridization between the orange and other citrus fruits at Suhumi has been disappointing. Most hybrids produce fruits of inferior quality and have no economic use. However, some material showing promise for back crosses with orange has been selected. Some of these hybrids are hardy and early.
Some nucellar seedings of orange, obtained by a method involving multiparental pollination with the pollen of several orange varieties, are as hardy as the Unshu (= Satsuma) mandarin and produce good quality fruit. It is claimed that foreign pollen has a strong effect upon the development of nucellar embryos, particularly during their early phases of growth, and the use of pollen of hardy varieties is recommended in breeding oranges for hardiness.

2971 Zanotti, L.
Arancio Ovale. (**The orange Ovale**).
Ital. Agric. 1952 : **89** : 325–31.

This Italian orange, which may have arisen in Sicily by bud mutation from Belladonna, is described from the botanical and biological aspects, including its resistance to adverse conditions due to weather, disease or storage during transport.

2972 Bitancourt, A. A.
Estudos sôbre a "tristeza" dos citrus. II. Susceptibilidade das diversas combinações de enxertia de laranjeira doce e laranjeira azêda. (**Studies on the "tristeza" disease of citrus. II. Susceptibility of the different stock-scion combinations of sweet orange and sour orange**).
Arq. Inst. Biol., São Paulo 1951 : **20** : 39–52.

Various combinations of sweet and sour oranges showed that even in the presence of the virus, the symptoms of "tristeza" were shown only by sweet orange scions grafted in some way on sour orange stocks.

2973 Zorin, F. M.
(**The Unshu mandarin as an initial form in citrus breeding**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 34–40. [Russian].

Breeding hardy citrus fruits, involving Mičurinite methods, at the Soči Experimental Station of Subtropical Plants is reported. Descriptions are given of promising new material derived from the Unshu (= Satsuma) mandarin.
Hybrid 2004, from Unshu x orange, produces pale orange fruits, with good keeping properties, weighing 50–225 grm. Hybrid 3008, from Unshu x grapefruit, has pale orange fruits with the consistency and flavour of the flesh resembling those of the female parent. They weigh 200 grm. each. The hybrid is hardy and shows promise as a fruit of the grapefruit type in the Krasnodar territory. Hybrid 320, from Unshu x Shiwa, is hardy, early and productive. It produces yellow fruits, weighing 60–70 grm., with a flesh of good flavour. Hybrid 119, from Unshu x Clementine, is hardy and produces fruits which weigh 40–60 grm. Their peel is thin and the flavour good. The hybrid is regarded as promising material for crosses with large fruited citrus species.
Mention is made of several nucellar seedlings of the Unshu mandarin, one of them, Sočinskiĭ A–23 [Soči A–23], being described.

2974 Batchelor, L. D. and Calavan, E. C.
Longevity of lemon trees.
Calif. Agric. 1952 : **6** : No. 3 : 9–10.

Data on an orchard planted at the California Citrus Experiment Station in 1936 show that the incidence of quick decline and shell bark is least among strains of Lisbon. In 1948 the

latter averaged 39% more fruit than Eureka selections.

2975 Roy, R. S. and Syed Fashiuddin Ahmed.
Description of Bihar guava varieties.
Indian J. Hort. 1951 : **8** : No. 3 : 22–23.
The varieties Harijha, Safeda, Babshi and Seedless are described. Hybrids involving these varieties are being studied at the Fruit Research Station, Sabour.

2976 Mukherjee, S.
Pollen analysis in *Mangifera* in relation to fruit-set and taxonomy.
J. Indian Bot. Soc. 1951 : **30** : 49–55.
The high percentage of normal pollen grains observed in 13 species suggests that low fruit setting capacity results from inadequate transference of pollen produced by male flowers to the stigmas of bisexual flowers on the same panicle, and not from male sterility.
Giant grains were found in two varieties, Safdar Pasand and Bhuto Bombai; it is thought that they may be due to the formation of restitution nuclei caused by the failure of the second meiotic division in the pollen mother cells.

2977 Castagni resistenti al cancro. (**Chestnuts resistant to canker**).
Agricoltura Tosc. 1952 : **7** : 66.

Biraghi, A.
Caratteri di resistenza in *Castanea sativa* nei confronti di *Endothia parasitica*. (**Features of resistance of *C. sativa* to *E. parasitica***).
Boll. Staz. Pat. Veg. Roma 1950 : **8** : 167–80.
The discovery of a number of canker resistant chestnuts in Liguria, Italy, is recorded. The trees exhibited the usual lesions and swellings but a defence reaction followed in which wood and cork were formed and the growth then proceeded normally.
The longer paper contains some additional comments on resistance in relation to chestnut species.

2978 Biraghi, A.
Fatti nuovi per la lotta contro il cancro della corteccia del castagno. (**New facts in the attempt to control chestnut blight**).
Humus, Milano 1952 : **8** : 13–14.
The writer amplifies Pavari's findings (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2984) by reference to his own recent discoveries in Liguria, Italy (cf. Abst. 2977).

2979 Clapper, R. B.
Relative blight resistance of some chestnut species and hybrids.
J. For. 1952 : **50** : 453–55.
Comparative blight resistance of *Castanea mollissima*, *C. crenata*, *C. dentata* and various interspecific and intervarietal hybrids ranging in age from 5 to 13 years was determined at Glenn Dale, Md. The most promising hybrids combining some degree of resistance to *Endothia parasitica* with desirable timber quality originated from a cross between the blight susceptible *C. dentata* and a selection of *C. mollissima*.
The nuts of this hybrid are of good quality and much larger than those of *C. dentata*. Back crosses to *C. mollissima* increased the degree of blight resistance which almost equalled that of the recurrent parent; unfortunately, growth rate and timber quality also resembled *C. mollissima* more closely, consequently the back cross progenies are of little practical value as timber trees.
Analyses of F_1 and back cross progenies indicate that blight resistance is probably controlled by two pairs of genes.
Crosses between the tree chestnuts and *C. alabamensis*, *C. floridana*, *C. Margaretta*, *C. ozarkensis* and *C. pumila* have led to the production of several early bearing hybrids which supply food for wild life. The everbearing habit of *C. Seguinii*, a small introduction from China, appears to be dominant in numerous crosses; the resultant hybrids are however highly susceptible to blight.

2980 Rjadnova, I. M.
(**The hardiness of large-fruited hazels**).
Agrobiologija (Agrobiology) 1952 : No. 1 : 153–55. [Russian].
Hardiness trials with several varieties of hazel at Krymskaja, Krasnodar territory, are reported. The wild hazel, whose reproductive organs were the least susceptible to frost injury, is recommended as a pollinator for cultivated varieties.

2981 **Georgia certifies new peanut.**
Crops and Soils 1952 : **4** : No. 8 : p. 30.
Dixie Spanish, a new high yielding groundnut selected from Spanish 146 at the Georgia Coastal Plain Experiment Station, has been certified by the Georgia Crop Improvement Association. The new variety outyields Small Spanish by 17·5%.

2982 Carpentier, S.
Étude morphologique et cytologique de l'action de substances fongicides ou insecticides sur la croissance de la plantule d'arachide. (**A morphological and cytological study of the action of fungicides or insecticides on the growth of young plants of the groundnut**).
Rev. Bot. Appl. 1951 : **31** : 598–605.
The seed disinfectants Granopera, Verisan and Arasan + hexachlorocyclohexane were found to induce a high degree of polyploidy in groundnuts.

2983 Bailey, W. K.
Virginia type peanuts in Georgia.
Bull. Ga. Agric. Exp. Sta. 1951 : No. 267 : Pp. 22.
The results of trials of varieties and selections of the Virginia type in Georgia since 1941 are surveyed. The relatively small-seeded selection Virginia Bunch 67 is a promising substitute for NC Runner. Of the medium sized groundnuts tested, Virginia Bunch (G) and Virginia Runner (G) have both outyielded NC Runner and Small Spanish. Three selections developed from a cross between Jumbo Runner and a selection derived from a cross of NC Runner with Dixie Giant have shown promise.

2984 Kaule, P. W.
Annual report of the Coconut Research Scheme for 1948.
Ceylon 1950 : Sess. Pap. 22 : Pp. 27.
Yield trials and selection for high yielding capacity are reported. At the Bandirippuwa and Ratmalagara Estates a few high yielding emasculated dwarf palms were pollinated by selected tall individuals; the seed set averaged only 22%.

2985 Kaule, P. W.
Annual report of the Coconut Research Scheme for 1949.
Ceylon 1951 : Sess. Pap. 22 : Pp. 42.
Significant differences in the yielding ability of progenies from high yielding, low yielding and unselected palms are already apparent after the tenth year, although their full bearing capacity has not yet been reached. Several outstanding individuals, each bearing more than 50 nuts per year, have been selected from the Marandawila plantation of F_1 seedlings from crosses between nine high yielding palms.
Hybridization between dwarf and tall palms continues (cf. Abst. 2984) in an attempt to combine desirable characters of both types.

2986 Nixon, R. W.
Ecological studies of date varieties in French North Africa.
Ecology 1952 : **33** : 215–25.
Five date varieties recommended for desert areas of French North Africa are compared with five varieties which can be grown in the marginal districts of Tunisia and Algeria. All the marginal dates are early maturing, ripening well before the late summer rains and in temperatures considerably lower than those of desert areas. Two very late-maturing varieties, Fteemy and Deglet Noor, require high desert temperatures for ripening; like other varieties adapted to the desert conditions, they are highly susceptible to damage from rain or high humidity.

2987 Morettini, A. and Massacesi, A.
Il Leccio del Corno. Razza di olivo molto resistente alle basse temperature ed al *Cycloconium*. (**Leccio del Corno. An olive variety highly resistant to low temperature and to *Cycloconium***).
Ital. Agric. 1952 : **89** : 299–304.
In the course of a study of olive varieties in the Province of Florence, a variety of obscure ancestry and probably originating from the Val d'Elsa district has been found to be resistant to low temperature and to *Cycloconium*. It has been named Leccio del Corno from the estate where it was first observed.
Its morphological characteristics and floral biology are described. The leaves, which persist on the branches longer than usual, are more resistant to *Cycloconium* than those of all other varieties commonly regarded as resistant in the district. The oil yield is normal and of good quality.

2988 Alonso Olivé, R. E.
Observaciones sobre el cultivo y mejoramiento de la fruta bomba. (**Observations on the cultivation and improvement of the papaya**).
Bol. Estac. Exp. Agron. Cuba 1952 : No. 67 : Pp. 160.
Starting with an historical introduction, this monograph on *Carica Papaya* considers the composition, uses and botanical classification of the plant and of the related species and genera; the floral types and their different distributions on the trees, making up 15 sex types which are distinguished, described and illustrated and serve to explain various cases of supposed sex reversal; various factors which may or may not affect the expression of sex and its inheritance; technique of hybridization

and inheritance of characters; the varieties in cultivation in Cuba and their characteristics; intervarietal and interspecific crosses; chromosome numbers and polyploidy; parthenocarpy and ovocarpy; and various cultural practices including vegetative propagation.

2989 KRONENBERG, H. G.
Een E.C.A. reis voor het klein fruit. (**An ECA tour for the study of small fruits**).
Euphytica, Wageningen 1952 : **1** : 64–68.
An account is given of the selection, breeding, production, harvesting and marketing of small fruits in the USA.

2990 PANASJUK, M. I.
(**Dessert wines from pure varieties of fruit**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. 2 : 19–22. [Russian].
Several varieties of apple, plum, cherry, currant and gooseberry are being tested at the Mleev Horticultural Scientific Research Station for making wines. The material includes the black currants 15717, 15732 and 15830, bred from 1024 x Goliath, and 15646 from Obiljnaja [Prolific] x Goliath.

2991 KUZJMIN, A. JA.
(**The problem of suppressed inheritance in plants**).
Doklady Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : **73** : 1029–31. [Russian].
A method of artificial pollination facilitating the suppression of female inheritance in some hybrids (cf. Abst. 1430) with special reference to a hybrid between the red currant variety Kyzyrgan and the black currant Vosjmaja Devisona [Davison's Eighth] is briefly discussed.

2992 VAARAMA, A.
Morphological and cytological studies on colchicine-induced tetraploid *Ribes nigrum*.
Suom. Maataloust. Seur. Julk. 1947 : **67** : 55–92.
The threshold value for c-mitosis in the root tips of *R. nigrum* was found to be the concentration of 0·014%. The compact group formed by the chromosomes at metaphase was a particularly interesting feature of c-mitosis.
Five 4*n* strains induced by colchicine treatment of the growing tip of seedlings were compared with the control variety Brödtorp. The width of the leaf and flower parts of the tetraploids increased comparatively more than the length. Stoma size and berry size and weight also increased. Seed fertility was 26·3 to 58·1% that of the control. The pollen of the tetraploids was very disuniform in size. The tetraploids began to flower 2 to 4 days earlier than the diploids. Germination rate, studied in only one 4*n* strain, was quicker in the tetraploids. The tetraploids had a lower ascorbic acid content and higher total acid content in the expressed sap of the berries. The flavour of the 4*n* fruits was stronger. It is stressed that the morphological and physiological properties of the different 4*n* strains varied according to the genotypes of the original undoubled forms. Observations on meiosis in the tetraploids are given. In addition to univalents, bivalents, trivalents and quadrivalents at metaphase I, associations of a higher order were observed, providing evidence of structural interchanges, assumed to be the result of the colchicine treatment. Compared with the control the 4*n* strains showed a lower chiasma frequency. Possible causes of the lack of natural polyploids and aneuploids in the genus *Ribes* are discussed.

2993 HEINISCH, O.
Die vordringlichsten Zuchtziele bei Sanddorn (*Hippophaë rhamnoides* L.). [**The most pressing objectives in breeding sea buckthorn (*H. rhamnoides* L.)**].
Züchter 1952 : **22** : 144–47.
The value of the plant lies in its sand-binding capacity and its high and stable vitamin C and, to a lesser extent, A content. Breeding should aim at more detachable and longer fruit stalks, firmer berries, reduction or suppression of thorns, and greater berry size if this can be achieved without sacrificing vitamin C content.

2994 CHOUARD, P.
Sur le photopériodisme chez quelques fraisiers. (**On photoperiodism in various strawberries**).
CR Acad. Sci. Paris 1947 : **225** : 1362–64.
Perpetual-flowering strawberry varieties proved indifferent to day length in contrast to single-flowering varieties in which flowering increased as day length diminished. The response of wild strawberries was heterogeneous, showing that physiological races exist in respect of photoperiodic reaction.

2995 BAKER, R. E.
Inheritance of fruit characters in the strawberry: a study of several F_1 hybrid and inbred populations.
J. Hered. 1952 : **43** : 8–14.
Large size, glossiness of surface, uniformity, elongated shape, light seed colour and sunken

seed position showed dominance or heterosis. The results for colour and flavour were inconclusive. The importance of choosing parents with good combining ability for large fruit size, glossiness, uniformity and light seed colour was demonstrated.

2996 KENNARD, W. C. and MECARTNEY, J. L.
1951 strawberry variety trials at State College, Pennsylvania.
Progr. Rep. Pa. Agric. Exp. Sta. 1952 : No. 66 : Pp. 3.

Out of the eight commercial varieties tested, Temple proved to be the best, all aspects being taken into consideration. One of its advantages is resistance to red core and leaf spot.

2997 SIMMONDS, N. W. and SHEPHERD, K.
An Asian banana (*Musa acuminata*) in Pemba, Zanzibar Protectorate.
Nature, Lond. 1952 : **169** : 507–08.

Specimens from three localities in Pemba have been identified as *M. acuminata*. Pollination experiments on specimens from one locality have suggested that the nearest relative of this collection is the Buitenzorg form, to which it bears, however, little phenotypic resemblance. No evidence of the occurrence of the species in Zanzibar has been obtained. On the basis of the different geological histories of Pemba and Zanzibar, it is possible to regard *M. acuminata* as native to Pemba. An alternative but less plausible view is that *M. acuminata* was introduced comparatively recently, presumably by Arab travellers about a thousand years ago.

2998 MALAN, E. F.
Can grapes be cultivated in the Lowveld ?
Fmg. S. Afr. 1952 : **27** : 246, 253.

Early varieties which can withstand the summer rainfall and associated prevalence of fungous diseases, resting only for a short period during the winter months, are recommended for northern and eastern Transvaal. Concord, Catawba, Golden Muscat, Ferdinand de Lesseps, Isabella and other *Vitis Labrusca* hybrids are particularly well adapted to these conditions.

2999 Nuove uve da tavola Italiane. (**New Italian dessert grapes**).
Ist. Frutticoltura e Elettrogenetica, Roma 1951 : Pp. 111.

The Istituto di Frutticoltura e di Elettrogenetica [Institute of Fruit Culture and Electrogenetics] in Rome has been responsible for compiling this handsome volume on Italian dessert grapes. The varieties are described in the order of their originator, with indications of their origin, main cultural features, flavour and quality, and a full-page photographic illustration, usually in natural size. Hybrids by such well known breeders as Bogni, Dalmasso, Manzoni and Prosperi appear, and under the section "Pirovano Hybrids" a brief exposition is also given of the methods employed by the director of the Electrogenetics Institute in the production of his famous hybrids, including his technique of pollination by insufflation and treatment of pollen in electromagnetic fields. The volume terminates with tables of the varieties arranged according to their time of ripening, their pruning requirements and, finally, their fruit quality and colour.

3000 *TABIDZE, D. I.
(New Georgian varieties of vine).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 3 : 36–41. [Russian].

Descriptions are given of new varieties developed recently at the Institute of Viticulture and Wine Making of the Georgian Academy of Sciences, including Kartuli, Saadreo [Early Georgian] from Madeleine Angevine x Agostenga, Mtis Vazi [Mountain Grape] from Aljvarna x Muhranuli, Didmtevana Çiteli [Red Large Bunch] from Desjatifuntovyĭ [Ten Pounds] x Cabernet-Sauvignon, Sahalho Tetri [White People] from Vermentino x Apapnyž and Gvinis Tetri [White Wine] from Rkaciteli x Kisi.

3001 KUZJMIN, A. JA.
(Changes in the maturity date and quality of the produce in vine seedlings).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 4 : 34–36. [Russian].

At Mičurinsk, changes which occurred in hybrid 54, from Čuaš x Rupestris du Lot, and hybrid 8, from Russian Concord x Ezandari Belyĭ [White Ezandari], are described. They are attributed to the effects of external conditions. Hybrid 54, which was selected for its earliness, has lost its early habit. Hybrid 8 showed an improvement in bunch size and colour and weight of the individual fruits.

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* An extended summary of this paper is on file at the Bureau.

3002 Sibašvili, Z. G.
(A new pollination method for breeding vines).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. 3 : 34–35. [Russian].

An improved technique, involving emasculation and light rubbing of the inflorescences with cotton wool before covering them with paper bags containing pollen, has been developed in Georgia. Rkaciteli pollinated by this method with Rupestris du Lot pollen developed more fruits and the hybrid seed gave more uniform progenies than the seed obtained by the normal method.

3003 Ponce, J. R. and Zuluaga, P. A.
Contribución al estudio de la biología floral de la vid en Mendoza. **(Contribution to the study of the floral biology of the vine in Mendoza).**
Rev. Fac. Cienc. Agrar. Argent. 1950 : **2** : 37–51.

Self sterility in some of the vines grown in the Mendoza zone of Argentina may lead to defective set and a study was therefore made of the 114 varieties in the vine collection of Cuyo university. The varieties are ascribed to one or other of six floral types, which are defined, according to the degree of development of the male and female organs. It is expected that by selection it will be possible to improve the fertility of some of them.

3004 Bertrand, G. and Bertrand, D.
Sur les causes de la variation de teneur des vins en rubidium. **(On the causes of the variation in the rubidium content of wines).**
CR Acad. Sci. Paris 1949 : **228** : 1622–25.

Differences in the rubidium content of wines is due, in part, to corresponding varietal differences in the grapes.

3005 Vega, J.
Las uvas "criollas" o Sudamericanas. **(Native or South American grapes).**
Rev. Fac. Cienc. Agrar. Argent. 1950 : **2** : 59–61.

Several forms have been distinguished within the two types known as Criolla Grande [Large Native] and Criolla Chica [Small Native] and a collection of all the local vines of the Mendoza zone of Argentina is being made for further study.

3006 Levadoux, L.
Comportement de la vigne en hiver. **(Behaviour of the vine in winter).**
Agriculture, Paris 1952 : **16** : No. 131 : 13–15.

The physiological basis of cold resistance in the vine is considered: it is attributed to resistance of the cell and of the individual organs. The resistance threshold varies with the species and possibly somewhat within the species. Though not systematically pursued, French attempts to produce resistant hybrids by interspecific crossing have been successful to some extent. Resistant vines of Couderc, Seibel, Seyve-Villard, Oberlin, Castel and Baco are mentioned. Notes on results in Canada, USA and USSR are added.

FORESTRY

3007 Strand, L.
Progeny tests with forest trees.
Hereditas, Lund 1952 : **38** : 152–62.

The quantitative concept of genotype developed by Lush with reference to animal breeding is here applied to progeny tests of forest trees. The tables drawn up from the formulae worked out by the author indicate that, with 4 replications, an increase in the number of individuals per plot from 4 to 50 only affects the accuracy slightly. Assuming that mating within a stand is random, it is relatively unimportant to know the genotypic value of the male parent.

3008 Houtzagers, G.
Forest genetics and poplar breeding in the Netherlands. I. The difference between breeding work in forestry and agriculture or horticulture.
Euphytica, Wageningen 1952 : **1** : 10–14.

Several differences between methods of forest tree breeding and those employed in improving agricultural and horticultural crops are discussed. In the author's view forest tree improvement should be based on three methods: (1) vegetative propagation of material that already has satisfactory quality and vigour of growth; (2) production of an F_1 generation as ideal as possible, to be accomplished by establishing seed orchards of grafted material derived from plus trees; and (3) exploitation of heterosis through interspecific hybridization. The advantages of using a large number of genotypes in sylviculture are stressed. Attention is also drawn to the achievements obtained from poplar breeding in the Netherlands during the last 20 years.

3009 Lindgren, R. M.
The disease problem in relation to tree improvement.
Forest Genetics "Tree Improvement" Conference, Atlanta, Georgia, January 9, 1951 : Pp. 5.

Attempts to improve the disease resistance of forest trees in the USA are discussed with reference to: new physiological races of fungi to which hitherto resistant individuals are susceptible; the susceptibility of newly developed hybrids to pathogens which were harmless to their parents; and the risk of epidemic diseases in homogeneous populations. Selection among variable stands has produced shortleaf pines with increased resistance to little leaf, longleaf pines with greater resistance to brown spot, and loblolly and slash pines possessing improved resistance to canker and rust. Hybridization is recommended especially in connexion with introduced diseases.

3010 Bartlett, H. H.
Regression of x *Quercus Deamii* towards *Quercus macrocarpa* and *Quercus Muhlenbergii*.
Rhodora 1951 : **53** : 249–64.

A comparative study of the hybrid oak *Q. Deamii* and its putative parents, and a study of the progeny obtained from the hybrid by uncontrolled pollination suggest that its parents were *Q. Muhlenbergii* and *Q. macrocarpa*, rather than *Q. Muhlenbergii* and *Q. alba* as previously supposed.

3011 Muller, C. H.
The significance of vegetative reproduction in *Quercus*.
Madroño 1951 : **11** : 129–37.

It is pointed out, in a discussion of the rhizomatous habit in American species of *Quercus*, that species spreading in this way constitute an assemblage of longlived clones in which the rate and evolutionary significance of sexual reproduction are reduced, as is also the rate of introgression by other species.

3012 Grehn, J.
Über Spaltungserscheinungen und photoperiodische Einflüsse bei Kreuzungen innerhalb der Sektion *Populus Leuce* Duby. (**On segregation phenomena and photoperiodic influences in crosses within the section *P. Leuce* Duby**).
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 62–69.

On crossing two different ♀ *P. canescens* trees with ♂ *P. tremula* forms from different latitudes, the progenies, which were populations, segregated in each case into clearly separate groups of normal and dwarf plants; the same kind of segregation occurred on crossing *P. canescens* with *P. nigra*. Dwarf descendants were the only forms obtained from a cross *P. tremula* x *P. tremula*, in which one parent came from northern Sweden. In this latter case dwarf growth was found to be due to photoperiodic adaptation to long day conditions, whereas in the crosses with *P. canescens* the occurrence of dwarf progeny is probably due to the direct effect of growth genes.
The groups of normal plants showed increased growth due to heterosis and improved form compared with the plants from the grey poplar, hitherto generally used for multiplication. Multiplication of the hybrid between *P. canescens* and *P. tremula* is recommended.

3013 Seitz, F. W.
Zwei neue Funde von Zwitterigkeit bei der Aspe. (**Two new cases of hermaphroditism in the aspen**).
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 70–7.

Runquist's findings concerning an androgynous aspen discovered in northern Sweden are discussed, and his specimen compared with a Bavarian hermaphrodite found by the writer in 1951. The Swedish specimen proved to be an androintersex and the Bavarian a gynohermaphrodite. From each of these specimens selfed progenies were reared; the value of such forms in aspen breeding is indicated.

3014 Schröck, O. and Stern, K.
Untersuchungen zur Frühbeurteilung der Wuchsleistung unserer Waldbäume, zugleich ein Beitrag zur Pappelzüchtung. (**Investigations on early determination of growth capacity in our forest trees, also a contribution to poplar breeding**).
Züchter 1952 : **22** : 134–43.

By plotting annual growth measurements on a combined probability/logarithmic scale straight lines were obtained; this enabled extrapolations to be made, permitting selection for final growth capacity after 4–5 years of measurements for fast growing and after 8–10 years for slow growing trees. A study of the growth increments within individual growing seasons made it possible to detect types with disturbed growth due to photoperiodic or other factors.

3015 Day, W. R.
A note on canker development in poplars and willows.
Ned. BoschbTijdschr. 1948 : No. 11 : 323–30.

Resemblance between cankers of *Salix alba* var. *coerulea*, considered to be caused by the local action of frost, and cankers of certain hybrids of *Populus* is emphasized. It is suggested that differential reaction to frost injury should be investigated more thoroughly when breeding for disease resistant poplars.

3016 **International Chestnut Commission.**
Unasylva 1951 : **5** : 173–74.

An account is given of the meetings which have led to the International Chestnut Commission, whose establishment was authorized at the FAO conference at Rome in November 1951. The programme of the Commission includes genetical studies in connexion with disease control, and problems of rehabilitation of chestnut plantations, such as use of disease resistant types and tannin-rich varieties.

3017 Rovskiĭ, B. M., Ozolin, G. P. and Solovjeva, A. I.
(**Breeding elms for resistance to Dutch elm disease**).
Lesnoe Hozjaĭstvo (Forestry) 1950 : No. 4 : 43–45. [Russian].

At the Central Asiatic Scientific Research Institute of Forest Industry, a small-leaved elm and some hybrids between this and other species, including a cross involving *U. densa* as a male parent, showed resistance to the above disease.

3018 C., A.
Un *Eucalyptus* hybride intéressant, x *E. favieri* Chev. (**An interesting *Eucalyptus* hybrid, x *E. favieri* Chev.**).
Rev. Bot. Appl. 1951 : **31** : p. 684.

The discovery in France of a putative hybrid *E. linearis* x *E. coccifera* is recorded.

3019 Chevalier, A.
Travaux français sur le genre *Eucalyptus*. (**French work on the genus *Eucalyptus***).
Rev. Bot. Appl. 1952 : **32** : 105–12.

The paper deals with the discovery of the genus and its introduction into France and Algeria, new species found in North Africa, and recent work on Australian species. French contributions to the subject are stressed.

3020 **New tree varieties for shelterbelt planting released for South Dakota.**
Crops and Soils 1952 : **4** : No. 8 : p. 28.

A rust resistant strain of cottonwood and a winter hardy strain of Chinese elm have been developed at the South Dakota State College; so far neither has been named (cf. Abst. 204).

3021 **Report of the Director of Forests for the year 1949–50, Queensland 1950** : Pp. 41.

Pinus. Selfed progenies of exotic pines in southern Queensland show uniformity in development and morphology. Characters such as the size and angle of the branches and number of whorls per unit length of stem are correlated with those of the corresponding parent trees. Attempts to establish cuttings of *Pinus caribaea* and *P. Taeda* have been unsuccessful; work is therefore to be concentrated on selfed progenies to determine the most promising mother trees.

3022 Langner, W.
Reziprok unterschiedliches Verhalten von Lärchenbastarden gegen eine Nadelerkrankung. (**Different behaviour of larch reciprocal hybrids towards a needle disease**).
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 78–81.

Two-year-old seedlings and nursery plants of *Larix europaea* were attacked by an unidentified fungus causing browning and dying off of the needles in spring. *L. leptolepis* was unattacked. Crosses were then made with 16 Japanese larches (B1–16) and one European larch (B17). It was found that hybrids in which the mother was *L. leptolepis* were resistant to the disease, whereas the reciprocals were susceptible. This difference in behaviour is thought to be possibly conditioned by the cytoplasm.
As yet unfinished work on the susceptibility of *Pinus sylvestris* to *Lophodermium Pinastri* suggests analogous behaviour to that described in the larches.

3023 **Thirty-second Annual Report of the Forestry Commissioners for the year ending September 30th 1951.**
Forestry Commission, London 1952 : Pp. 82.

Brief reference is made to the selection of superior parent trees from plantations of beech, European larch, Scots and Corsican pine in different parts of the United Kingdom. Adaptability trials of promising poplar clones have been established in 17 localities.

3024 Little, E. L. and Dorman, K. W.
Geographic differences in cone-opening in sand pine.
J. For. 1952 : **50** : 204–05.

In the Choctaw River region of western Florida a distinctive race of *Pinus clausa* has been found, whose cones open to release the seeds at maturity. The species is normally characterized by retaining most cones unopened on the tree for several years, thus preventing adequate seedling regeneration in areas where the wood is used extensively for pulp manufacture. It is therefore suggested that the race with open cones, designated Choctawhatchee, may profitably take the place of the typical species in areas where reafforestation is necessary.

3025 Schmidt, H.
Die Verzweigungstypen der Fichte (*Picea Abies* L.) und ihre Bedeutung für die forstliche Pflanzenzüchtung. [**The types of branching of the spruce (*P. Abies* L.) and their significance for forest tree breeding**].
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 81–91.

A comparative study was made of the timber-producing capacities of the Kammfichte, a spruce with spreading branches and a parabolic outline, and the Plattenfichte, a short-branched spruce with a cylindrical outline. Owing to its large crown, the yield from the spreading form grown singly is higher than that from isolated trees of the short-branched type, but in close stands the yields are about equal. By choosing the spreading type for forest breeding instead of the short-branched type no increase in timber yield per acre can be expected, owing to the need for allowing wider spacing in the case of the spreading form. Caution is therefore necessary in seeking to apply breeding results from singly grown trees to forest stands. No morphological character was found from which a genetic tendency to superior growth performance might be derived.

3026 Pomeroy, K. B.
Modern trends in an ancient industry.
J. For. 1952 : **50** : 297–99.

Promising seedling progenies have been obtained from 12 individual slash and long leaf pines giving outstanding yields of resin at the Lake City research centre of the US Forest Service. It is hoped that their superior resin producing quality will be combined with desirable timber characteristics.

3027 Johnson, A. G.
Spontaneous white pine hybrids.
J. Arnold Arbor. 1952 : **33** : 179–85.

A small hybrid swarm of *Pinus Strobus* x *P. parviflora* is described. The type individual has been designated *P. Hunnewelli*. This partially fertile hybrid displays marked heterosis and is promising as an ornamental. It should prove useful as breeding stock for incorporating characters of *P. parviflora* into *P. Strobus*. Probable hybrids of *P. Peuce* x *P. parviflora* have also been detected.

3028 Løfting, E. C. L.
Danmarks skovfyrproblem. (**The problem of the Scots pine in Denmark**).
Forstl. Forsøksv. Danm. 1951 : **20** : 1–109.

The adaptability of introduced races of *Pinus sylvestris* of varying provenance to heath and dune habitats in Denmark is described. Racial reaction is determined both by summer temperature and precipitation, the latter factor being important in so far as it affects soil temperature.

3029 Stoeckeler, J. H.
A northeastward extension of the range of Douglas fir.
J. For. 1952 : **50** : p. 393.

A particularly hardy strain of *Pseudotsuga taxifolia*, with a high degree of resistance to drought and frost, appears to be well-suited for shelter belts and reafforestation in the northern Great Plains. It was found in northeastern Montana, some 150 miles further east and north of the normal geographical range of this species.

3030 Scheffer, T. C. and Englerth, G. H.
Decay resistance of second-growth Douglas fir.
J. For. 1952 : **50** : 439–42.

Considerable genetic variation in degree of resistance to decay by six strains of *Poria* and *Fomes* was found among *Pseudotsuga taxifolia* grown in the Willamette National Forest, Ore.

VEGETABLES

3031 Küppers, G. A.
Überblick über Züchtungsversuche an der Topinambur bis zum 2. Weltkrieg. (**Survey of breeding experiments with the Jerusalem artichoke up to the 2nd world war**).
Z. Pflanzenz. 1952 : **31** : 196–217.

A historical survey of the cultivation of the Jerusalem artichoke is given including also the

history of the names used for the plant in various European countries. A summary of research on breeding work in France, the USA and Germany is also provided.

3032 Martín, G.
Action de la colchicine sur les tissus de topinambour cultivés "in vitro". (**Action of colchicine on tissue cultures of the artichoke**).
Rev. Cytol. Cytophysiol. Vég. 1945 : **8** : 1–36.

Experiments with tissue cultures of the artichoke showed that the c-mitotic effects of colchicine are only exerted in the presence of a growth substance such as heteroauxin. Giant cells, 7–8 times as large as normal cells, were also produced by the colchicine treatment, and these were observed to divide by amitotic fragmentation, new cell walls being laid down between the nuclear fragments without the intervention of a phragmoplast.

3033 Svensson, V.
Om lök och lökodling. (**On onions and onion growing**).
Weibulls Allehanda 1952 : **12** : No. 1 : 24–28.

The performance of a few varieties and strains of onions tested at Weibullsholm Plant Breeding Institute is recorded. Among those for use as sets, W : s 50 Zittauer gul [W : s 50 Zittauer Yellow] is specially recommended for its keeping quality. It is also recommended for raising from seed, for though surpassed in yield by Rijnsburger, the latter does not keep so long. Weibulls Hybrid, obtained from a cross of specially selected strains of different origin, exhibits heterosis in yield and the number of large bulbs. It is very uniform in colour and shape and can be recommended as a vigorous onion of the Rijnsburger type.

3034 Vorster, P. W.
Suitable onion varieties for the Transvaal.
Fmg. S. Afr. 1952 : **27** : 259–60.

The results of experiments carried out at the Pretoria Horticultural Research Station for the last five years indicate that the photoperiod limits the number of locally developed and introduced varieties which can be grown successfully. Short day varieties such as Texas Grano and Early Cape Flats mature well before the rainy season and are consequently most suitable.

3035 Agati, G.
Indagini ed osservazioni sulla biologia fiorale della cipolla. (**Investigations and observations on the floral biology of the onion**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1952 : **36** : 67–77.

The systematic classification of *Allium* spp, the morphological development of the flower, anthesis and pollination are discussed. Cross pollination, which appears to be the rule, is effected mainly by bees and other insects. Precautions to ensure purity of seed include single variety cultures and bagging of the entire inflorescence, which should be tapped periodically during the flowering season.

3036 Andrew, W. T.
Vegetative reproduction of onions by the headset method.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 208–12.

A method of vegetative propagation by clipping the inflorescences, preferably at the earlier stages of development, is described. Clipping only and clipping plus subsequent application of growth regulators were equally effective in giving bulbils. Varieties differed in their response to the treatment. The use of this method in breeding is indicated.

3037 Gasiorkiewicz, E. C., Larson, R. H., Walker, J. C. and Stahmann, M. A.
Induced variability in *Pyrenochaeta terrestris* by nitrogen mustard.
Phytopathology 1952 : **42** : 183–92.

The reactions of the onion varieties Utah Sweet Spanish, Yellow Globe Danvers, Yellow Bermuda and Excel to 12 mutants of *P. terrestris* La. 20 and 13 mutants of *P. terrestris* Wis. 1 are recorded. These mutants were induced by treating the parent isolates with 0·01 mM per ml. nitrogen mustard. Considerable similarity was found between the range of pathogenicity and cultural characteristics of these artificially induced mutants and numerous natural isolates obtained from Wisconsin and Louisiana; severe symptoms characteristic of natural virulent strains were produced by several mutants arising from the mildly virulent parent strains. It is suggested that natural variants may have originated by spontaneous mutations in strains which still exist.

3038 HARTMAIR, V.
Der gegenwärtige Stand der Kopfkohlzüchtung in Österreich. (**The present position in breeding cabbage in Austria**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1952 : **2** : 109–11.

The research of Kopetz and of Krickl has shown that it is possible by breeding to convert summer into winter forms, that are resistant to cold and do not bolt; such varieties may be planted in autumn where the climate is mild and even in severe mountain climates, if planted early, remain free from bolting. Breeding for such types is needed in Austria owing to the wide range of variation of the climate. In 1950 Danish élite strains tested at 1150 m. proved a complete failure.
The aims in future breeding and selection are early varieties or strains which show good inside development without too high a proportion of outer leaves and which are at the same time sufficiently free from bolting and capable of being grown in the harsh climates of mountain districts.

3039 TOMETORP, G. and HINTZE, S.
Klassificerande försök med vinterdill, bladkål och brysselkål 1948–1951. (**Classifying trials with winter dill, kale and Brussels sprouts 1948-1951**).
Medd. Stat. Trädgårdsförsök 1951 : No. 71 : Pp. 12.

TOMETORP, G. and HINTZE, S.
Nya godkända stammar av vinterdill, bladkål och brysselkål. (**New approved strains of winter dill, kale and Brussels sprouts**).
Försök och Forskning 1952 : **9** : p. 5.

The Swedish Committee for the Classification of Vegetables has approved the following as first class varieties: the light green, winter dill OE/51 which yields well; the kale Låg extra krusig OE/51 [Short Extra-Curly OE/51] which combines satisfactory yield with very curly leaves; and the Brussels sprouts selections Amager Ge F/51 and OE/51 which gave good yields of superior quality.

3040 SCHERMERHORN, L. G.
New rhubarb variety looks promising.
Hort. News. N.J. 1952 : **33** : 2513, 2528.

Selection 134 (Macdonald x Sutton's Seedless) is outstanding for its vigour and large yields of desirably coloured stalks, and is now under commercial trial in New Jersey.

3041 POPE, D. T., MUNGER, H. M. and CAREW, J.
Chlorosis in celery—an inherited magnesium deficiency.
Fm. Res. 1952 : **18** : No. 2 : p. 10.

In trials at the Cornell University Agricultural Experiment Station, Utah 10B and Emerson Pascal proved unable to take up magnesium as readily as Utah 15 or Summer Pascal, particularly when supplied with nutrients containing low concentrations of magnesium. Marked chlorosis resulted from magnesium deficiency. Analyses of the F_2 progeny from Utah 10B x Summer Pascal indicate that inability to extract sufficient magnesium from the soil solution is controlled by a single recessive gene.

3042 LEWIS, D. and CROWE, L. K.
Male sterility as an outbreeding mechanism in *Origanum vulgare*.
Heredity 1952 : **6** : p. 136. (Abst.).

Contrary to previous reports that male sterility in *O. vulgare* is cytoplasmically determined, evidence has been obtained for control by two major genes. One dominant gene causes anther abortion; its action is suppressed by the other dominant gene which is epistatic to the first. The double recessive is lethal. A balance between the two sexes is obtained partly by this lethality, but mainly by the increased vigour of the female which offsets the disparity of nuclear contributions.

3043 REHM, S.
Male sterile plants by chemical treatment.
Nature, Lond. 1952 : **170** : 38–39.

In experiments at the Department of Agriculture, Pretoria, treatment with growth-regulating substances has resulted in male sterility in cucurbitaceous plants and the tomato for periods of one to several weeks. It is pointed out that a method of inducing male sterility by a simple chemical treatment would be of great value in breeding and in the commercial production of F_1 hybrids.

3044 WHITAKER, T. W.
Genetic and chlorophyll studies of a yellow-green mutant in muskmelon.
Plant Physiol. 1952 : **27** : 263–68.

A mutant form with light green foliage was detected among progeny of an inbred line, 34417, derived from a cross between powdery mildew resistant cantaloupe selections at La Jolla, Calif. Analyses of segregating progenies indicate that the yellow green phenotype is dependent upon a single gene, *y*, which is completely recessive in the heterozygous

condition. It is assumed that the gene originated as a somatic mutation in a single runner of a homozygous andromonecious green plant, *YY*; subsequently two types of ♂ gametes, *y* and *Y*, were produced on this runner. Heterozygous individuals have normal green foliage, but among their progenies homozygous plants occur; the latter show no marked reduction in vigour or reproductive capacity, and differ from normal green plants in amount of pigment and ratio of chlorophyll components.

3045 KIHARA, H.
Triploid watermelons.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 217–30.

A survey is presented of investigations carried out in Japan since 1939 in connexion with the development of seedless triploid water melons, by crossing diploids and colchicine-induced tetraploids. An account is given of the following: mode of production of triploids; morphological and cytological characteristics of 2*n*, 3*n* and 4*n* plants; features helpful in the identification of triploids; the fruits of triploids and tetraploids; factors underlying the seedlessness of triploids; and practices recommended for the commercial cultivation of triploids. As a rule the triploids contain only small, white rudimentary seeds which can be eaten like unripe cucumber seeds. The chief factor responsible for sterility is the production of aneuploid gametes. Parthenocarpy in the triploids is induced by pollination with insect-carried *n* pollen. Occasionally empty seeds of normal size and colour are produced, especially among the earliest fruits. The breeding of triploids is regarded as promising. Certain improvements are however required, such as elimination of empty seeds and less irregular fruit shape.

3046 HOHLAČEVA, N. A.
(An interspecific gourd hybrid).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 12 : 18–22. [Russian].

Promising material was obtained at the Krasnodar Vegetable Breeding Station from Stolovaja Zimnjaja A–5 [Table Winter A–5] x Perehvatka 69/19 [Girdle 69/19]. The incompatibility between ♀ *Cucurbita maxima* and ♂ *C. moschata* was overcome by vegetative rapprochement. The fertility of the F_1 and F_2 was improved by training and the F_3 showed extensive segregation. Several families remarkable for their high sugar content, good keeping properties and flavour and high yielding capacity were selected. Morphologically, the hybrids chiefly resembled the female parent, but a few individuals had some characters of *C. Pepo*, not involved in the breeding history of either parent form.
The hybrid had cylindrical fruit stalks which were thicker at the place of attachment, large yellow seeds with a broad twisted rim, and a special type of leaf. None of these characters could be found in the cultivated species of the World Collection.

3047 MUDRA, A. and NEUMANN, D.
Probleme und Ergebnisse der Münchеberger Ölkürbiszüchtung. **(Problems and results of the Müncheberg oil pumpkin breeding).**
Züchter 1952 : **22** : 99–105.

Wide variations between and even within lines were observed in respect of such characters as growth habit, time of ripening, fruit number, form and colour, and oil content. The weight of seeds per plant was chiefly correlated with number of fruits per plant, since the number of seeds per fruit was roughly constant.
Study of a number of F_1 hybrids showed bushy habit, which is preferred in cultivation, to be dominant to trailing. Number of fruits per plant and number of locules per fruit are still under investigation and their mode of inheritance has not yet been established; the latter character can certainly be increased by selection. The inheritance of hardness of testa indicated the presence of more than the two genes assumed by Schoeniger (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2221). The seeds germinated quite well if fully ripe and in sound condition. Inbreeding has so far caused no loss of vigour and lines with high locule number per fruit and lines with many fruits per plant are being selected for crossing in the hope of combining these two characters. No heterosis has so far been observed in F_1 hybrids from inbreds except in earliness.
No success was obtained in interspecific crosses between *Cucurbita Pepo*, *C. maxima* and *C. moschata* after three years of vegetative rapprochement; a natural hybrid of *C. moschata* x *C. maxima* was obtained but proved sterile in both selfing and back-crossing. Polyploids produced by colchicine treatment have set very few seeds.

3048 LANA, E. P. and TISCHER, R. G.
Evaluation of methods of determining quality of pumpkin for canning.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 274–78.

Methods of testing for canning quality were studied, using three selected inbreds, with a

view to facilitating breeding work. The Adams consistometer provided a satisfactory means of predicting, from fresh samples, the consistency of the canned product.

3049 Wilson, J. D. and John, G. A.
A "ginkgo leafed" mutation in the cucumber.
J. Hered. 1952 : **43** : 47–48.
Mutants characterized by leaves resembling those of the ginkgo, complete sterility and slower growth than normal siblings depend upon a single pair of recessive factors.

3050 **American Tomato Yearbook Westfield, New Jersey 1952** : Pp. 36.
The yearbook includes a list of recent references on varietal trials and disease resistance and other aspects of tomato production and disease control in the USA. Other contents of particular interest deal with varietal acreages in the different states and with the Tomato Genetics Cooperative. The latter is an informal organization for the exchange of information and stocks. Its coordinating committee is at the Division of Truck Crops, University of California, Davis, Calif.

3051 Chodat, F. and Gagnebin, F.
Documents génétiques et horticoles sur la tomate. (**Genetical and horticultural literature on the tomato**).
Rev. Hort. Suisse 1952 : **25** : 74–79, 114–19, 147–53.
Based upon a selected bibliography and the authors' own knowledge of the breeding of horticultural crops at the Experimental Station of the Botanical Institute of the University of Geneva, this comprehensive, but concise, review covers research up to 1950 on the botanical classification, morphology, reproduction, disease resistance, hardiness, genetics and cytology of the tomato.

3052 Jucci, C.
Ricerche citogenetiche e fisiogenetiche. (**Cytogenetic and physiogenetic researches**).
Genet. Iber. 1950 : **2** : 267–75.
Reference is made to studies of salivary gland chromosomes and of interspecific crosses in malarial mosquitoes, which have shown the important role played by inversion in speciation. Individuals of these species are almost invariably homozygous for the inversions, but genetic variability exists in the composition of any given population.
In tomatoes, the gene *R* for red pulp also increases the synthesis of β-carotene. Synthesis of lycopene is inhibited at temperatures above 30° C, whereas the synthesis of β-carotene is unaffected. Even prolycopene, the stereoisomer which takes the place of lycopene in the Tangerine tomato, is synthesized quite successfully above 30° C.

3053 Butler, L.
The linkage map of the tomato.
J. Hered. 1952 : **43** : 25–35.
The value of genetic stocks of the tomato in teaching is emphasized and the behaviour of the genes for pigment, fruit abscission and fruit shape is surveyed. A list of gene symbols and descriptions of characters suitable for linkage studies are provided; only characters found in stocks available at Toronto University are dealt with. The 12 linkage groups are defined and illustrated by a chart.

3054 Lana, I. P.
New tomato hybrids for Iowa.
Iowa Fm. Sci. 1952 : **6** : 116–17.
Information is given on the performance of three promising F_1 hybrids, Earliana x Jubilee, Rutgers x John Baer and Indiana Baltimore x Pritchard in recent trials. All three exceed commonly grown varieties in yield and compare favourably with them as regards fruit quality and size.

3055 Currence, T. M., Fogle, H. and Moore, J. F.
Breeding tomatoes for ascorbic acid content.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 245–53.
Inheritance of ascorbic acid was studied in the cross Tiny Tim x Stemless Pennorange. Association between *wt* for wilty foliage on chromosome 5 and ascorbic acid content was detected. Using the partitioning method of genetic analysis devised by Powers *et al.* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2692), data were obtained giving some indication that three genes, two major and one minor, control ascorbic acid content in this cross. Ascorbic acid content was negatively correlated with fruit weight, locule number and weight per locule. Multiple correlation of locule number and weight per locule with ascorbic acid content was highly significant. Data from a cross between Michigan State Forcing and a small-fruited local strain known as Sugar further indicated that the projects of increasing ascorbic acid content without sacrificing fruit weight are not at present promising. Tests were carried out on the combining ability of 27 varieties for

ascorbic acid content in crosses with two F_1 hybrids and of 8 of these varieties in all possible hybrid combinations with each other. It appears that crosses between two varieties with high ascorbic acid content are most likely to give selections with the highest possible ascorbic acid content.

3056 Turbin, N. V., Bogdanova, E. N. and Horošavina, A. M.
(The investigation of the effect of supplementary fertilization upon fertilized egg cells of tomatoes).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1952 : No. 2 : 66–85. [Russian].

The influence of multiparental supplementary pollination upon the inheritance of several varieties of tomatoes was investigated at Leningrad State University. The varieties involved in the crosses as female parents, Aphiachette, Planovyĭ [Plan], Želtyĭ Persik [Yellow Peach], Želtyĭ Mičurina [Mičurin's Yellow] and Earliana Širokolistnaja [Broad-leaved Earliana], had one or several recessive characters, while the varieties supplying the pollen for supplementary pollination were selected for one dominant character each. The method consisted of pollinating emasculated and isolated flowers of the female parent with self pollen and then, 5–25 hours later, with the foreign pollen of one variety or mixed pollen of two, three and four varieties.
Analyses of the F_1, F_2 and F_3 showed that some hybrids carried the characters of several male parent varieties. It is concluded that the egg cells are capable of assimilation of foreign pollen introduced after their fertilization with self pollen.

3057 Aĭzenštat, Ja. S.
(The effect of foreign pollen upon the fertility and fruit characters of hybrids).
Doklady Akad. Nauk SSSR. (Rep. USSR Acad. Sci.) 1951 : **77** : 1095–98. [Russian].

The following methods of pollination were tested in Leningrad on tomatoes Ficarazzi x Earliana, Višnevidnyĭ Krasnyĭ [Red Cherry] x Zolotaja Koroleva [Golden Queen], Golden x Buddenovka [Budennyĭ], wild tomato 1615 x Planovyĭ and Zolotaja Koroleva x Višnevidnyĭ Krasnyĭ. The female variety was pollinated (*a*) with a large amount of pollen of the male parent, (*b*) with 20–30 pollen grains of the male variety (restricted pollination), (*c*) with 20–30 pollen grains and a large amount of pollen of domestic varieties of potato and tomato, and (*d*) with 20–30 pollen grains and a large amount of pollen of wild *Solanum* and *Datura* spp.
The material pollinated with the pollen of related wild and cultivated plants had a higher percentage of fruit setting and fertility and produced heavier and larger fruits than hybrids obtained by restricted pollination. The fruit setting capacity and fertility of wild tomato 1615 x Planovyĭ (restricted pollination) + wild potato and *Datura* pollen were higher than those of 1615 x Planovyĭ (large amount of pollen). Similarly, the fertility of hybrid Višnevyĭ Krasnyĭ x Zolotaja Koroleva (restricted pollination) + pollen of the related species was higher than that of the hybrid from the cross Višnevidnyĭ Krasnyĭ x Zolotaja Koroleva (large amount of pollen).
The seed of the hybrids produced by methods (*c*) and (*d*) had a healthier appearance than the seed of those obtained by restricted pollination.

3058 Aĭzenštat, Ja. S.
(The effect of training the first hybrid generation in varied ecological and geographical conditions upon the character of segregation).
Doklady Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **76** : 459–60. [Russian].

The F_2 of several tomato hybrids bred at Maĭkop showed differences in the inheritance of habit and leaf shape when the F_1 was trained under varied conditions. The effect of environment was most marked in Bison x Planovyĭ [Plan] when grown in the arctic circle and in Bison x Aphiachette at Gorjkiĭ. Most of the F_2 plants from the first named cross (96·1%) had an indeterminate habit, and most of the F_2 from the other cross (94·1%) had dissected leaves, i.e. dominant characters of the female parent type.

3059 Reynard, G. B.
Inherited resistance to radial cracks in tomato fruits.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 231–44.

Varieties and strains were graded according to the relative severity of cracks extending radially from the stem scar of ripe fruits of field-grown plants. Four classes of severity of radial cracking and one representing freedom from cracking of this type were used in scoring. All the important commercial varieties were susceptible to radial cracking. Crack-Proof, developed by the Burgess Seed and Plant Co., Galesburg, Mich., was however highly resistant. In crosses

between Crack-Proof and susceptible varieties resistance to radial cracking appeared to be recessive to susceptibility. Evidence of linkage between the cracking resistance and pattern of uniform ripening of Crack-Proof was obtained; the latter character depends upon the gene pair *ugug* (formerly u_2u_2). Selections have been developed from these crosses possessing a satisfactory combination of radial crack resistance and commercially desirable characters of the fruit and plant. The effect of rainfall, methods of sampling for resistance to cracking and breeding for resistance are discussed.

3060 Lamm, R.
Försök med drivtomat i England och Holland. **(Experiments with forcing tomatoes in England and Holland).**
Årsb. Svensk. Jordbr. Forsk. 1952 : 109–18.

One section of this article deals with achievements in England (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 7, Vol. XX, Abst. 2147 and Vol. XXI, Abst. 2418) and at Wageningen and Naaldwijk in Holland in the breeding of forcing tomatoes of various types. Qualities and aptitudes under investigation include *Verticillium alboatrum* resistance of the Dutch varieties Essar and Simi and the nematode resistance of *Lycopersicon peruvianum*. The possibility of breeding a *Cladosporium fulvum* resistant tomato is also receiving attention.

3061 Walter, J. M. and Conover, R. A.
Hereditary resistance to late blight of tomato.
Phytopathology 1952 : **42** : 197–99.

Two late blight resistant ornamental varieties with very small fruits, received from southern Florida, have been crossed with large-fruited susceptible varieties at the Homestead and Bradenton experiment stations, Fla. All the commercial varieties chosen for hybridization with the ornamentals P–1 and P–3 are resistant to one or more common diseases other than late blight. Numerous segregates possessing a high degree of blight resistance were selected from F_2 generations and back-crossed to the commercially desirable varieties to improve fruit quality. Data suggest that the resistance transmitted by P–1 may be determined by a single incompletely dominant factor, but segregating F_2 populations derived from P–3 do not fit a single factor hypothesis. Analyses of the F_3 resulting from crosses between P–3 and Manasota, STEP 68, Mo. S–34 and some Manahill selections indicate that resistance depends on a dominant factor which is modified by one or more accessory factors; this would account for the three distinct levels of resistance observed.
Young resistant plants show a hypersensitive reaction to infection which tends to weaken with approaching senility. In Florida, however, large necrotic lesions do not appear on the leaves until after the main crop has matured.

3062 Ciccarone, A.
Resistenza a *Sclerotium Rolfsii*, Sacc.? **(Resistance to *S. Rolfsii*, Sacc.?)**
Ital. Agric. 1952 : **89** : 180–81.

The resistance of the tomato varieties Quarantino, Re Umberto [King Humbert], Sioux, Panamerica and Sementella was tested in districts of Volturno and the plain of Salerno, where *S. Rolfsii* commonly does much damage. Apparently, it should be possible to isolate highly resistant lines from some of the Italian varieties. These lines could then be improved by breeding.

3063 Peay, W. E. and Blood, H. L.
Cavities and thrips within tomato fruits.
Seed World 1952 : **70** : No. 7 : 20–22.

Considerable variation in the percentage of fruit containing cavities in which thrips could survive was found among 44 standard varieties and 10 *Verticillium* resistant strains growing at the Utah Agricultural Experiment Station. The occurrence of cavities proved to be correlated with the size of the stylar scar at the blossom end; therefore plants producing fruit with large blossom end scars are being culled from seed plots. Varieties with very few cavities are listed and recommended for canning.

3064 Fyfe, J. L. and Bailey, N. T. J.
Plant breeding studies in leguminous forage crops. I. Natural cross-breeding in winter beans.
J. Agric. Sci. 1951 : **41** : 371–78.

The frequency of cross pollination in winter beans (*Vicia Faba*) has been estimated by sampling a stand for the monofactorially determined character, hilum colour, and scoring the progeny of the sampled plants in respect of the same character. The proportion of cross-fertilized plants varied from 31·2 to 48·5%. It is pointed out that partially cross-fertilized crops should not be bred as though they were self-pollinators, especially as vigour may be associated with cross fertilization.

3065 González Ríos, P. and Riollano, A.
El mejoramiento de la habichuela blanca del país (*Phaseolus vulgaris*) por medio de la selección. [**Improvement of the local white bean (*Ph. vulgaris*) by means of selection.**]
Bol. Univ. Puerto Rico Est. Exp. Agric. 1951 : No. 94 : Pp. 22.
Over 3000 selections from the best local populations have been tested and those finally retained have proved superior to the imported varieties in yield, resistance to *Empoasca fabalis*, protein and fat content and freedom from fibre.

3066 Conroy, R. J. and Wilson, R. D.
Mottle leaf of Tweed Wonder beans.
J. Aust. Inst. Agric. Sci. 1952 : **18** : 33–38.
Symptoms observed on the Tweed Wonder variety of *Phaseolus vulgaris* in New South Wales resemble the inherited variegation appearing in Corbett Refugee (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 1226). There was, however, no apparent correlation between the presence of mottled leaves on Tweed Wonder selections and the occurrence of affected plants among their progeny; both normal and variegated individuals were produced by variegated and green parents.

3067 Borzini, G. and Picco, D.
Accertamento della resistenza relativa di razze di fagiolo allo *Sclerotium Rolfsi* e ad una *Rhizoctonia* sp. (**Determination of the comparative resistance of races of beans to *S. Rolfsi* and a species of *Rhizoctonia*).**
Notiz. Malattie Piante 1949 : No. 2 : 25–28. (Mimeographed).
Inoculation experiments and comparative plot tests at Maccarese in Italy demonstrated the greater resistance of the variety Regina alta di Monsummano of *Phaseolus vulgaris* to both the above fungi. Other varieties tested were Rosso Americano, the dwarf variety Regina nana, and Regina alta, of which Regina alta di Monsummano is a local selection.

3068 Walters, H. J.
Bean research for 1951.
Mim. Circ. Univ. Wyo. Agric. Exp. Sta. 1952 : No. 15 : Pp. 22.
A report is given of experiments carried out at the Big Horn Research Station, Powell, Wyo., on the control of bean diseases, including tests for resistance to halo blight, bacterial wilt, *Fusarium* root rot and white mould (*Sclerotinia sclerotiorum*), chiefly on varieties and selections suitable for dry bean production. Pinto 72 and several other varieties showed a high degree of resistance to root rot.

3069 Yarwood, C. E.
The phosphate effect in plant virus inoculations.
Phytopathology 1952 : **42** : 137–43.
Data on the number of lesions produced on certain hosts by ten viruses inoculated in the form of water suspensions are compared with the effect of inoculations with virus solutions containing phosphate. Michelite beans which are normally susceptible to tobacco mosaic virus developed four times as many lesions when treated with phosphate; White Blue Lake and other virus resistant hosts showed a higher percentage increase in disease susceptibility following phosphate treatment than those normally susceptible to viruses in the absence of phosphate.
It is assumed that the increased severity of disease symptoms results from alterations in host tissues rather than from increased virus infectivity.

3070 Welch, J. E. and Grimball, E. L. (Jun.)
Natural crossing in lima beans in South Carolina.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 254–56.
Data were obtained at the US Regional Vegetable Breeding Laboratory, Charleston, indicating that the amount of natural crossing under conditions in South Carolina may exceed 25% as a result of insect pollination.

3071 Toole, V. K., Wester, R. E. and Toole, E. H.
Relative germination response of some lima bean varieties to low temperatures in sterilized and unsterilized soil.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 153–59.
Varietal differences in germination at low temperatures under laboratory conditions are reported; such tests can provide valuable data in breeding for cold hardiness (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2456). Germination of all varieties tested was considerably higher in sterilized soil than in soil infested with *Rhizoctonia* and other microorganisms, at 15° C. Giant Calico gave a significantly higher germination percentage in both sterilized and unsterilized soil at this temperature than any other variety. There appeared to be a relationship between low germination and the presence

of a sunken area on the inner face of the cotyledon; this area was often attacked by fungi. It is stressed that the viability retained by hard dormant seeds in cold soils should not be mistaken for evidence of true tolerance of cold in infested soils.

3072 BRITTINGHAM, W. H. and MORTENSEN, J. A.
Varietal differences in shellout percentages in the southern pea, *Vigna sinensis*.
Proc. Amer. Soc. Hort. Sci. 1951 : **58** : 257–62.

A study of 12 cowpea varieties revealed varietal differences in shellout percentages when the pods were shelled by either hand or machine. Hand shellout percentages ranged from 60·7 to 73·1%. Varieties differed considerably in their response to mechanical shelling, shellout percentages ranging from 32·2 to 63·6%. The percentage loss in potential yielding ability due to machine shelling varied from 8·5 for Extra Early Blackeye to 47·4 for Brown Crowder. Measurement of fresh yields on the basis of gross pod weight, shelled peas by hand and shelled peas by machine give dissimilar relative gradings of the 12 varieties (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2456).

3073 HARE, W. W.
Reaction of cowpea varieties to *Fusarium* wilt.
Phytopathology 1952 : **42** : p. 283. (Abst.).

Tests were carried out on 78 varieties to determine their reactions to two races of *Fusarium* wilt. Varieties showing resistance to both races included Alabrowneye, Arlington, Calhoun Crowder, Iron, Six Weeks Ala and Speckle.

3074 FULTON, R. W.
Mutation in a tobacco necrosis virus strain.
Phytopathology 1952 : **42** : 156–58.

The apparently spontaneous and random appearance of red necrotic spots at the margins of white lesions on the Blackeye variety of *Vigna sinensis* inoculated with a single strain of tobacco necrosis virus has been investigated at the Wisconsin Agricultural Experiment Station. Ten other virus strains causing white lesions also produced red spots resembling sectors; from these spots strains producing only red necrotic lesions were obtained. Leaves inoculated with mixed isolates from red and white lesions showed separate red and white lesions, the former developing sooner than the latter. Although it is recognized that viruses may not undergo mutations comparable with mutations in other organisms, the term mutant has been applied to each of the red lesion strains. There were no apparent reversions from red to white lesion strains.

3075 PROBST, A. H. and CUTLER, G. H.
Perry soybean.
Soybean Digest 1952 : **12** : No. 5 : 12–13.

The soya bean variety Perry is being released for cultivation in Illinois, Indiana, Kansas and Missouri. Selected from a cross between Patoka and L 7–1355, it produces high yields of medium to large-sized yellow seeds with high oil content; it matures about three days later than Wabash and nine days earlier than S–100.

3076 TJUGINA, E. I.
(Vegetative hybridization of soya bean).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 32–36. [Russian].

Experiments on vegetative hybridization of soya bean at the Institute of Soya Bean and Castor Oil Plants in the USSR (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1997) have been continued. The present report includes detailed descriptions of changes which occurred in the F_0 and F_1 of the grafted hybrid Novokubanskaja 52 [New Kubanj 52] on VNIIMK* 9186. The F_1 and F_2 showed heterosis. The mentor method was used successfully to improve the size and colour of the seed of the productive F_2 Polukuljturnaja [Semicultivated] x Kubanskaja 276 [Kubanj 276] and to transmit earliness to the promising sexual F_3 hybrids Kubanskaja 4958 [Kubanj 4958] x Ussuriĭskaja 128 [Ussuri 128] and Kubanskaja 4958 x Alučinskaja 094. The stock used as mentor for improvement of seed quality was Kubanskaja 276 and that for introducing earliness was Kubanskaja 4958 x (M 7300 x 7298).
Vegetative hybridization was tested as a method for production of hybrid seed. The most promising results were obtained with intravarietal material which showed a very high percentage of compatible grafts.

3077 WILLIAMS, L. F.
The inheritance of certain black and brown pigments in the soybean.
Genetics 1952 : **37** : 208–15.

The confusion concerning genetic symbols used to designate seed coat pigments of the soya bean

* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

is discussed. Black, brown and reddish brown coats are due to an allelic series, *R*, *r* and r^0, but these colours develop only when combined with *T*, the gene for tawny pubescence. In conjunction with *t* the allelic series produces imperfect black, buff (*rt*) and buff (r^0t) seeds, respectively; imperfect black seeds develop only in the presence of *W* for purple flowers.
Five phenotypically indistinguishable genetic types with buff seeds have been found. The three following types reported for the first time are derived from crosses involving T 24, an imperfect black variety (*RtW*): (1) *Rtw* from Peking (*RTw*) x T 24; (2) *rtW* from T 116 (*rTW*) x T 24; and (3) *rtw* from T 24 x Harbinsoy (*rTw*). The two other buff-seeded types are PI 82273 (r^0tW) and r^0tw from Ogenia (r^0Tw) x PI 82273.

3078 Weber, C. R. and Moorthy, B. R.
Heritable and nonheritable relationships and variability of oil content and agronomic characters in the F_2 generation of soybean crosses.
Agron. J. 1952 : **44** : 202–09.

Observed and genotypic correlation coefficients between agronomic characters are compared in the F_2 of three soya bean crosses, Adams x Hawkeye, Adams x Habaro and Habaro x Mandell, grown at Ames, Ia. Adams and Hawkeye were chosen for their high oil content, while the other two varieties have very low oil content. Transgressive segregation was noted for most characters in all three crosses, suggesting slight differences between the varieties in respect of a few genes conditioning the characters studied. Positive correlations were found between seed yield and plant height, seed yield and date of maturity, and time of flowering and date of maturity. The high positive correlation between oil content and period from flowering to maturity, in conjunction with a negative correlation between time of flowering and oil content, suggests that selection for high oil content may be achieved by choosing plants which flower early and mature relatively late.

3079 **New soybean developed by USDA-state research.**
Sth. Seedsman 1952 : **15** : No. 4 : p. 15.

Perry, a new soya bean with a high oil content, gives heavy seed yields when grown as a full season variety in southern Indiana, southern Illinois, central and southern Missouri and eastern Kansas. It was developed by cooperation between experiment stations in these states and the US Department of Agriculture.

3080 Feaster, C. V.
Bacterial pustule disease in soybeans: artificial inoculation, varietal resistance, and inheritance of resistance.
Res. Bull. Mo. Agric. Exp. Sta. 1951 : No. 487 : Pp. 26.

A technique of inoculating soya beans with *Xanthomonas phaseoli* var. *sojensis* by spraying with a water suspension of the bacteria is described; maximum infection was obtained when spraying was carried out during the period of widest opening of the stomata, between 7 a.m. and 1 p.m. In both field and greenhouse tests, Clemson Nonshatter was the most resistant variety; Ogden was moderately resistant. The lesions developing on Clemson Nonshatter were not typical of those on other varieties, being characterized by dark angular spots without pustular outgrowths and usually without a halo. Data from crosses of Lincoln, Boone and Ogden with Clemson Nonshatter and from backcrosses of the F_1 hybrids with their respective parents revealed that the resistance of Clemson Nonshatter depends upon a single recessive gene. Evidence that Lincoln and Ogden possess secondary multiple factors for resistance was obtained. The crosses of Clemson Nonshatter with Lincoln and Boone showed that no linkage exists between the factors for resistance to bacterial pustule and maturity.

3081 Šuljga, M. S.
(New varieties of pea at the Uladovo-Ljulinec Research Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 49–52. [Russian].

Several varieties of pea grown for seed, developed in recent years at Uladovo-Ljulinec, are described. Some of them are still under trial. The following new standards outyield Victoria Mahndorf by 2·7–4 c. per ha.
Uladovskiĭ 303 from MI x MIII is a mid-season variety producing yellowish-pink seed with good cooking properties and a 1000 seed weight of 225–240 grm. Uladovskiĭ 208, selected from Folger Heine, is a late green-seeded variety with a better flavour than Victoria Mahndorf. The 1000 seed weight is 160–170 grm. It has been released in several provinces of the Ukraine. Uladovskiĭ 5, a midseason variety, selected from Victoria Hörning, has yellowish-pink seed of good flavour. The 1000 seed weight is 310–340 grm. It has been made a standard in the Vinnica province.

Uladovskiĭ 387, from MI x MIII, is the most promising variety under trial. It outyields Uladovskiĭ 303, but is irregular in maturity and needs to be improved in this respect.

3082 Mitchell, W. G.
New Romack rights winter pea wrongs.
Sth. Seedsman 1952 : **15** : No. 6 : 24, 56.

An account is given of the winter pea Romack; because of its earlier maturity, greater vigour and resistance to root rot it shows promise of being a better cover crop than Austrian for the south east of the United States (cf. Abst. 1554).

3083 Lamprecht, H.
Über Chlorophyllmutanten bei *Pisum* und die Vererbung einer neuen, goldgelben Mutante. (**On chlorophyll mutants in *Pisum* and the inheritance of a new, golden yellow mutant**).
Agri. Hortique Genetica, Landskrona 1952 : **10** : 1–18.

A review of the known chlorophyll mutants in *Pisum* and their various modes of inheritance is followed by recommendations concerning the symbols to be used for genes determining chlorophyll production.
The author believes that reaction between environmental conditions and the plasmatype may be responsible for the occurrence of some types of variegation.
A new chlorophyll mutant *aurea*, of a golden yellow colour, is described, and attributed to the action of a single recessive gene *au*.
Possible causes of certain statistically significant deficiencies in the number of segregates carrying *au* and the gene *A* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 54) are discussed. *A* and *au* are probably strongly linked.

3084 Lamprecht, H.
Weitere Koppelungsstudien an *Pisum sativum*, insbesondere im Chromosom II (*Ar*). [**Further linkage studies on *P. sativum*, especially in chromosome II (*Ar*)**].
Agri Hortique Genetica, Landskrona 1952 : **10** : 51–74.

The known gene linkages in chromosome II are reviewed (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 54). The results of two crosses, one segregating for 16, and the other for 14 different genes, indicate that the *fn* gene for three flowers per peduncle lies in chromosome II, the gene sequence being *–Oh–Ar–S–Wb–K–Fn–*. An instance of apparently strong linkage between two genes *A* (basic colour gene) and *s* (agglutinated seeds), both undoubtedly located in different chromosomes, is explained as follows: *A* is linked with *miv*, the gene for distance between seeds in the pod; and an increase in this distance renders agglutination between seeds impossible, so that *A* and *s* appear to be linked.

3085 Šakurov, V. Z.
(**The method of vegetative hybridization of leguminous plants grown for their seed**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 1 : 31–33. [Russian].

Vegetative hybridization at the Kazanj State Breeding Station involved interspecific and intraspecific grafts of peas and beans. Several pea plants of the Capital type were obtained in the first seed generation of the graft Štambovyĭ 71 [Determinate 71] on Capital.

3086 van der Vaart, F. M.
The identification of pea varieties in the seedling stage.
Euphytica, Wageningen 1952 : **1** : 29–33.

The first two scale leaves have proved useful in varietal identification. The use of these scales, either alone or in conjunction with other characters, as a means of identifying 14 varieties of blue, marrowfat, dun and maple peas grown in the Netherlands is discussed.

3087 Barber, H. N. and Paton, D. M.
A gene-controlled flowering inhibitor in *Pisum*.
Nature, Lond. 1952 : **169** : p. 592.

Cleft-grafting experiments were carried out when the plumules were approximately 1 to 2 cm. long, using pea varieties with different times of flowering. The results indicated that a scion of a late variety grafted on an early stock is made significantly earlier than the ungrafted controls, and that an early scion grafted on a late variety flowers later than when ungrafted. The view is expressed that late varieties possess a growth inhibiting substance which is absent from early varieties. Experiments in which the cotyledons were removed from the seedlings showed that the inhibitor is present in the cotyledons of the late variety. Genetical analysis of the three varieties used is not complete but probably they are of the constitution l_2l_2, l_1l_1 and *LL*, respectively (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 662).

3088 Åkerberg, E.
Om kokbarheten hos matärter. (**On the cookability of culinary peas**).
Årsb. Svensk. Jordbr. Forsk. 1952 : 68–77.
Various factors that may affect cookability are discussed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2274).
Results of comparative trials of the cookability of different varieties at Ultuna, Linköping and Weibullsholm and at other Swedish research stations have led the writer to conclude that clear hereditary differences in cookability exist between varieties. Matson's assertion that phytin content exhibits varietal differences also finds some support.

3089 Sörgel, G.
Über die Ursachen der unterschiedlichen Resistenz verschiedener Erbsensorten gegenüber den Fusskrankheitserregern *Ascochyta pisi* Lib., *Ascochyta pinodella* Jones und *Mycosphaerella pinodes* (Berk. et Blox.) Stone. I. Vergleichende Untersuchungen zum Verhalten der Pilze auf einer stark und einer schwach anfälligen Sorte. [**On the causes of the varied resistance of different varieties of peas to the foot rot fungi *A. pisi* Lib., *A. pinodella* Jones and *M. pinodes* (Berk. et Blox.) Stone. I. Comparative studies on the behaviour of the fungi on a markedly and a weakly susceptible variety**].
Züchter 1952 : **22** : 4–26.
Experiments suggest that resistance in the sugar pea Graue Buntblühende to the above three fungi is conditioned by an antibiotic substance present in the seed coat. The evidence is based on the inhibitory action of decoctions of the seed coat upon the germination and growth of the fungi; but it is pointed out that this action may be partially masked by the amount of nutrient substance present in the seed coat.

3090 **Pea wilt: field identification and varietal resistance.**
N.Z. J. Agric. 1952 : **84** : p. 144.
The results of trials carried out at Christchurch, NZ, from 1948 to 1951 with local and imported varieties of garden and field peas, to determine their reaction to local isolates of *Fusarium orthoceras* var. *Pisi*, are summarized.

3091 Dmitriev, V. S.
(**The origin of *Vicia sativa* var. *platysperma***).
Agrobiologija (Agrobiology) 1952 : No. 1: 39–43. [Russian].
Lysenko's thesis of interspecific conversion is supported by experiments with lentils at the Institute of Genetics of the USSR Academy of Sciences. In these, seed of *Lens esculenta* is said to have produced several plants of *V. sativa* var. *platysperma*.
Reference is made to the failure of earlier investigators to obtain hybrids between these two species. This is used as an argument against possible hybridization.

3092 Pomogaeva, A. I.
(**New variety of table lentil, Petrovskaja Zelenozernaja**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 10 : 48–49. [Russian].
A productive new variety Petrovskaja Zelenozernaja [Green Seeded], showing resistance to drought, lodging and *Fusarium*, has been developed at the Petrovskaja Breeding Station from natural hybrids between yellow-seeded and green-seeded varieties. The new variety, a mid-season type, outyields the standard Petrovskaja 4/105 by 2·4 c. per ha., but its 1000 seed weight is 2 grm. lower.

3093 Gelin, O.
Mette sockermajs. (**The sweet maize Mette**).
Weibulls Allehanda 1952 : **12** : No. 1 : 1–2.
After tests of a varied collection of sweet maize at the Weibullsholm Plant Breeding Institute, the early hybrid variety Mette proved to be best suited to Swedish conditions and taste.

3094 **Recommend Gold Mine and Sun-Up corn.**
Seed World 1952 : **70** : No. 7 : p. 54.
In sweet corn variety trials reported from Delaware Agricultural Experiment Station two new yellow hybrids, Gold Mine and Sun-Up, matured earlier than any tested so far at the station.

3095 Palamarj, N. S.
(**A new method of breeding peppermint**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 2 : 42–44. [Russian].
Listovaja Mjata [Leaf Mint], reproduced by leaf cuttings from variety 324 at the USSR Scientific Research Institute of Essential Oil Plants, showed profound changes, including higher yields of leaves and essential oil. These are explained by Lysenko's theories of heterogeneity of tissues.

3096 JANSON, B. F.
***Fusarium* root rot and wilt of dill.**
Phytopathology 1952 : **42** : 152–55.

Evidence is presented for the occurrence of physiological races of the species of *Fusarium* isolated from infected plants of *Anethum graveolens* in Ohio. Over 95% of the seedlings failed to emerge from soil inoculated with isolate D 4, whereas only 10–30% were similarly killed by inoculation with other isolates.

BOOK REVIEWS

KEMPTHORNE, O.
The design and analysis of experiments.
Chapman & Hall, Ltd. London, John Wiley & Sons, Inc., New York 1952 : 68s. : Pp. xix + 631 : tables.

This is the second book from these American publishers on the subject of experimental design. The former, by Cochran and Cox, was didactic in the sense that it did not attempt to explain the designs in any detail, but was content to catalogue all the different forms, showing in each case how to set up the experiment and how to analyse the results. The present book is more ambitious. It "talks round" the subject by explaining those aspects of statistics which come into this particular specialization, and then describes the theoretical bases of the designs in considerable detail. The book merits the careful attention of all serious students of the subject, although the more mathematically equipped will be tantalized by a good deal of explanation of the "how" when what they really want is to hear more of the "why." The subject matter has by now become standard. After the introductory chapters the author goes on to randomization and the simpler forms of design such as randomized blocks and the Latin square. Four hundred pages follow which deal exhaustively with factorial design, confounding, fractional replication, and lattice and incomplete block designs. The final chapters will interest the practical worker who is concerned with groups of experiments, at different places or in different years, or who has to deal with residual effects of treatments applied in sequence.

J. W.

TIPPETT, L. H. C.
The methods of statistics.
Williams & Norgate Ltd., London 1952 : 4th ed. : 38s. : Pp. 395 : figs. : tables : diags.

This book has doubled in size since it was first published in 1931, which is perhaps a measure of the growth of the subject in that time. Revision has taken place on previous occasions (cf. *Plant Breeding Abstracts*, Vol. XV, p. 87), but not on nearly such an extensive scale as now. We thus have what is to all intents and purposes a new book. Unfortunately it has also doubled in price, but despite this it is recommended that everyone who has a copy of the first edition put it away and replace it by the fourth, and also that anyone else who wants a lucid and authoritative account of what the ordinary methods of statistics are about should acquire the book. The subject matter provides a good example of what to select as *necessary* for an introductory treatment. There is, of course, a great deal more, but that is better left to more advanced texts dealing with specialized topics.

Beginning with frequency distributions in general and distributions derived from the theory of probability in particular, the author goes on to show how these latter are used in tests of significance, differentiating between large and small sample tests. Two chapters follow on analysis of variance. Then follows a study of correlation, simple, multiple and partial, and the sampling errors associated therewith. The last chapters deal with non-linear regression and a miscellaneous series of problems met with in the practical applications of statistics. The plant breeder will note sections on the principles of experimental arrangement, random arrangement, randomized blocks and the Latin square, which, together with the general chapters on the analysis of variance, will carry him a good way along the road of the particular applications of statistics in which he is interested.

J. W.

DUNN, L. C.
Genetics in the 20th century. Essays on the progress of genetics during its first 50 years.
The Macmillan Company, New York 1951 : 37s. 6d. : Pp. xi + 634 : figs. : tables.

There have been recently a number of publications reviewing the development of different sciences during the past century. Few can unfold an account as soberly dramatic as that

presented by the Genetics Society of America in the papers which comprise this book. The committee responsible for planning the programme of the Golden Jubilee of Genetics, on which occasion these papers were delivered, is to be congratulated. It could not hope, as the editor points out, to treat comprehensively all fields of theory and practice. But it has achieved its expressed purpose of bringing together "in an extensive symposium, representative leaders from the early, the middle, and the late periods of genetical research."

As may be expected, no two of these papers are alike in style or matter. This lack of uniformity is an unexpected asset, since it vivifies what might otherwise have been monotonous or heavy reading.

The book opens on a triumphant note with a paper by Goldschmidt describing the impact of genetics on the other sciences. It is followed by an account of Mendel and his work by Iltis who describes Mendel, in the first place, as a monk with a strong sense of humour, a conscientious teacher, and a prelate struggling against the state; his scientific interests were only secondary.

A brief account of the long history of pre-Mendelian ideas, a tangle of fact and fiction, is given by Zirkle. In the scientific environment of to-day, this makes astonishing and often amusing reading. At first sight it is not surprising that the laws of heredity were not recognized until 1900. Very little progress was made in the greater part of the preceding thousand years, since the time when Burzurgh ibn Shahrizar described the manatee as a hybrid between an Arab and a fish. Yet some kind of particulate mechanism for the transmission of hereditary characteristics is cited by Aristotle more than a thousand years earlier than this. It is in fact somewhat surprising to find how much of what we now regard as characteristic of Mendelism was actually known in the hundred years before Mendel's publication of 1865. Observations indicating dominance and recessiveness had been described frequently; and a definite and accurate segregation ratio had been recorded eleven years earlier. Sex linkage had been known from the end of the eighteenth century, yet there was no realization of the simple nature of sex inheritance. Even after the publication of Mendel's work in 1865 a great deal of preparatory work had to be done before the time was ripe for a general understanding of the principles of heredity. Zirkle's paper, and those of Muller and Sturtevant remind one of the parts played by such outstanding men as Weismann, who cleared the ground by weakening the basis for a belief in the inheritance of acquired characters, and by Roux, Hertwig, Strasburger and Wilson, whose cytological work prepared the way for the chromosome theory of inheritance.

Castle's paper is of special value, coming, as he says himself, from one of the few survivors of the first decade of Mendelism in America. He described the prolific work of the early geneticists, and gives a brief account of his own part in the development of the young science. It is a pity that his modesty prompts him to refer to so many contemporaries by name; their inclusion here, instead of merely in the list of reference, obscures the main events in his history.

The papers by Muller, Sturtevant and Beadle describe respectively the development of the gene theory, the relation of genes and chromosomes, and chemical genetics. Their theme is less about our accomplishments than about our ignorance, our ignorance of the nature of genes and of the process by which they reproduce themselves, of the mechanics of meiosis, of the chemical structure of the nucleus, and of the process of cell differentiation. Much of the work described by Mirsky in a chapter on "Some Aspects of the Cell" is very recent, and is therefore the subject of active controversy. So also is that described by Caspersson and Schultz, who discuss the proposition that the chemical analysis of the loci in the chromosomes must be correlated with the changes in the phenotype observed by genetic means, before a fuller understanding of the chemistry of the gene can be attained.

Consciousness of the work still to be done underlies also the account by Mather, who has nevertheless probably done more than anyone since Darwin and Galton to explore the field of continuous inheritance. He explains the slow progress of this branch of genetics during the period of rapid development of the study of discontinuous inheritance; and he points out that only now, equipped with the knowledge of the behaviour and effects of individual genes, can the geneticist apply the tools of analysis and synthesis supplied by biometrics and statistics for the understanding of evolution and for the purposes of plant and animal improvement.

If evidence were needed for the vast actual and potential service to mankind which the development of genetics affords, this could be found in the chapters by Little, Gowen, Walker, Lush and Mangelsdorf. The genetic basis of cancer

is discussed by Little. Gowen gives an able account of the genetics of disease resistance, in which emphasis is laid on the importance of an understanding of continuous as well as of discontinuous inheritance. Disease resistance in plants is given a special niche by Walker. Lush outlines some of the advances made in animal improvement, and Mangelsdorf relates with typical vivacity the impressive story of hybrid maize.

A paper on the work of Swedish geneticists is a welcome feature. Müntzing describes the part played by his fellow countrymen in illuminating the field of theoretical cytogenetics for plant breeding purposes. There is a complementary paper on this subject by White. Comprehensive papers on cytoplasmic inheritance and microgenetics are given by Ephrussi, Sonneborn and Lederberg. A survey by the latter author, a great part of whose work was done only in the last decade, is of particular interest; it is however perhaps a trifle too lavish in technical detail, and the real importance of the work is not readily seen. Darlington, in a chapter on "Mendel and the Determinants," gives a general picture of genetical advance since the rediscovery of Mendel. He claims that cytoplasmic inheritance "will in future enable us to see the relation of heredity, development and infection, and thus be the means of establishing genetic principles as the central framework of biology." The field of human genetics receives capable attention from Snyder and Penrose, and there are timely warnings by the latter author about the difficulty and dangers of applying eugenic principles before sufficient is known both about human genetics and about the various branches of pure genetics. For example, in instances where natural selection favours the heterozygote, we must expect a healthy equilibrium of the whole population only at the price of the simultaneous production of some less well adapted individuals. This point is also brought out well by Dobzhansky in his paper on Mendelian populations. The paper by Irwin deals with immunology, a subject which has probably done more than any other to stimulate the interest of medical research workers in human genetics.

It is not surprising to find Huxley chosen to give the concluding paper. He fulfils his role of raising our eyes to the broader horizons of genetics, and even beyond them to the destiny of man: "Man is the spearhead of evolution, the sole agent or instrument of the cosmic process for securing further evolutionary advance." It is disappointing, and perhaps indicative of the general nature of his theme, that his concept of the evolution of the mind requires such vague terms as "world-stuff."

For all readers *Genetics in the 20th century* should at least provide a useful bibliography. For most, it will also be an interesting and fairly comprehensive survey of the progress of genetics in the last 50 years, with a natural emphasis on the work of American scientists.

CRANE, M. B. and LAWRENCE, W. J. C.
The genetics of garden plants.
Macmillan & Co. Ltd., London 1952 : 4th ed. : 20s. : Pp. xvii + 301 : 67 figs. : 44 tables.

The first edition of this well-known textbook was reviewed in *Plant Breeding Abstracts*, Vol. V, p. 270, the second in Vol. IX, p. 253, and the third in XVIII, p. 295. In the fourth edition, the brief account of heterosis which formerly appeared at the end of chapter VI on vegetable and salad plants has now been revised and expanded in a new chapter, to include some recent developments, such as use of male sterility and experiments at the John Innes Institution on the possible utilization of hybrid vigour in the tomato. The other chapters retain their previous arrangement but have been rendered more up to date by occasional additions and rewriting. Among the major additions are succinct accounts of the inheritance of flower colour in *Nemesia strumosa*, the genetics and chemistry of flower colour in *Dianthus caryophyllus* and of the genetics of *Brassica oleracea*.

DODSON, E. O.
A textbook of evolution.
W. B. Saunders Company, Philadelphia and London 1952 : 25s. : Pp. xviii + 419 : 101 figs.

Professor Dodson's textbook on *Evolution* is intended to provide an introduction to the subject for undergraduates for whom the well-known accounts by Dobzhansky, Goldschmidt, Mayr and Simpson would be too advanced. It serves this purpose well; a very wide field is covered, the material is arranged with discrimination, and the lay-out is excellent. In general, the author adopts the usual neo-Darwinism position, though with more deference to Goldschmidt's views than many neo-Darwinisms would concede. The treatment is not intensive; controversial points are not analysed in detail, but the book is conspicuous for its undogmatic tone.

The book contains nineteen chapters arranged under five parts. The first part is introductory;

it gives the historical background, and the evidences for evolution. Part II discusses the probable course of evolution of the plant and animal kingdoms and the origin of life. There are naturally many highly speculative suggestions in this part; possibly the author does not sufficiently stress the paucity of evidence for most of the major phylogenetic connexions, but, on the other hand, no attempt is made to present as fact what is only a matter of surmise. The genetical basis of evolution is dealt with in part III, and natural selection, isolating mechanisms, speciation, polyploidy and geographical distribution in part IV. The single chapter in part V deals with some of the more general implications of evolution.

It is remarkable how much of the relevant field the author manages to include, and while the treatment is necessarily rather cursory, the whole book is probably the best that has yet appeared for the class of readers for whom it is intended.

DOBZHANSKY, T.
Genetics and the origin of species.
Columbia University Press, New York and Geoffrey Cumberlege, London 1951 : 3rd ed. : 32s. 6d. : Pp. 364 : 23 figs. : 15 tables.

This new edition of Professor Dobzhansky's widely known work has been entirely rewritten to cover the far-reaching advances of genetical investigations and evolutionary concepts during the ten years that have elapsed since the publication of the second edition in 1941 (cf. *Plant Breeding Abstracts*, Vol. XIV, p. 837). As Professor Dobzhansky emphasizes in his preface, the last decade has been a period of wide synthesis in evolutionary knowledge; systematists, paleontologists, ecologists, embryologists and comparative anatomists are being greatly influenced by the evolutionary approach and are integrating their particular spheres of knowledge with genetical principles. Within the field of genetics itself, population genetics, with its evolutionary significance, has been a major development, which includes Professor Dobzhansky's own important contribution on population genetics in *Drosophila*. The author is thus particularly well-qualified to examine the dynamic causes of evolution, in the light of the present stage of knowledge. The chapter headings, some of which have been altered, reflect the intensification in the study of population genetics. The new edition contains ten chapters as follows: organic diversity; heredity and mutation; mutation in populations; selection; adaptive polymorphism; race formation; isolating mechanisms; hybrid sterility; species as natural units; and patterns of evolution. Professor Dobzhansky has been faced with an overwhelming abundance of books and papers, but at no point does he relax his grasp of essential principles or falter from his clear exposition. As a zoologist, he is naturally concerned mostly with animals, and especially with *Drosophila*, but much of the important work on plants receives its due share of scrutiny in this distinguished work of synthesis and lucidly argued hypothesis.

CLAUSEN, J.
Stages in the evolution of plant species.
Cornell University Press, Ithaca, New York 1951 : 22s. 6d. : Pp. viii + 206 : 76 figs. : 8 tables.

The work of Clausen, Keck and Hiesey has become almost a household word among plant geneticists, especially those interested in evolutionary aspects. This eminently readable version of their results by Dr. Clausen will therefore be welcomed by a wide circle of interested readers. In its original form the book consisted of lectures delivered at Cornell University in the autumn of 1950, namely, the Messenger Lectures on the Evolution of Civilization. That series was founded and its title prescribed by Hiram J. Messenger, B.Litt., Ph.D., of Hartford, Connecticut, who directed in his will that a portion of his estate be given to Cornell University and used to provide annually a "course or courses of lectures on the evolution of civilization, for the special purpose of raising the moral standard of our political, business, and social life." In the main the book is a summary of the already published results of the three authors but a certain amount of hitherto unpublished material is included to enhance the argument.

After an introductory chapter tracing the historical development of the species concept, the author proceeds to give a description of the local populations that constitute most natural species, by special reference to a number of species with the study of which he has himself been intimately associated for over 30 years. It is shown how these local populations may become separated into ecological races, how these may become further differentiated morphologically, genetically, cytologically or physiologically and ultimately produce the higher systematic categories we have come to know as subspecies, ecospecies, cenospecies, comparia

and genera. The extreme complexity of the processes involved is aptly illustrated, the many conflicting and cross currents involved point to the immense potentialities for variation and adaptation that still exist in nature, and on putting down the volume one feels that one has gained a perfectly clear insight into what the author calls "the intricate network that connects the life of to-day with that of the past." The book is admirably printed and illustrated and we are once more indebted to the administrators of the Messenger trust for making available to us a most stimulating, enlightening and edifying volume.

BLUM, H. F.
Time's arrow and evolution.
Princeton University Press, New Jersey 1951 : $4·00 : Pp. xi + 222 : 19 figs. : 11 tables : 4 plates.

In his interesting monograph *Time's Arrow and Evolution*, Dr. Blum probes the biochemistry of evolution and seeks to ascertain what light is thrown on evolution by our present biochemical knowledge. The principal conclusions drawn are of considerable interest, especially as they correct the somewhat exaggerated emphasis on the role of selection as the guiding factor in evolution that is common to-day. Several facts, such as the stereoisomeric specificity of the aminoacids, the ubiquitous operation of the adenylic acid energy transfer system, and the repeated occurrence of the porphyrin ring in widely different biological contexts, are used by the author to substantiate his view that the course of evolution is largely determined by the intrinsic biochemical constitution of the organisms concerned, while the latter may well have been determined by the chance array of organic compounds present when the transition from nonliving to living systems took place. While granting the importance of natural selection in effecting the choice between alternative lines of development, the author points out that the range of alternatives is far from unrestricted and was in fact determined by the remote chemical history of the earth.

Naturally, the author has to consider the origin of life. He points out, in this connexion, that the heterotrophic and autotrophic theories are not so sharply set off from one another as commonly supposed. While favouring the heterotrophic theory, the author admits that no plausible theory of accounting for the putative nonliving organic systems assumed by his theory to antedate the first appearance of life has been devised.

The relevance of the second law of thermodynamics to living systems is also considered, and the law is shown to apply as in nonliving systems.

The author is conscious that his curtailment of the role of selection is liable to result in a charge of teleology being laid against him. There are, of course, various senses in which this word is used, but the author makes quite clear that his thesis does not invoke any extra-physical entities.

Dr. Blum's book can be recommended to all those interested in fundamental biology. Biologists may perhaps find the preliminary explanations rather tedious, since the first eight expository chapters hardly go beyond the intermediate textbook level, but the remaining chapters will fully repay attention.

MILOVIDOV, P. F.
Physik und Chemie des Zellkernes. (**Physics and chemistry of the cell nucleus**).
Protoplasma Monographien 20, Naturwissenschaftlicher Verlag (Gebrüder Borntraeger), Berlin—Nikolassee 1949 : DM 36 : Pp. xiv + 529 : 33 figs. : 1 plate : 22 tables.

In the classical style of the German monograph, the present volume presents to the reader a large mass of information concerning the nucleus. The work of innumerable authors has been assimilated and painstakingly transcribed. An introductory chapter deals with the function of the nucleus in the cell, after which there are chapters devoted to the size and form of the nucleus, their variation and the factors influencing them; position and movement of the nucleus; the optical properties of the nucleus; its specific weight, colloidal structure and the real or imaginary nature of such structures as the nuclear membrane in young cells, the chromonema in the resting nucleus, or the spindle fibres; and the properties of the chromosomes, of nucleic acids and of nuclear proteins. There is an extensive chapter on vital staining and the electromagnetic and other phenomena associated with it, after which the osmotic phenomena characteristic of the nucleus and the probable metabolic interrelations between nucleus and cytoplasm are examined. Several pages are devoted to laying that old ghost, the chromidial theory, which every so often tries to rear its head again, in an attempt to prove the nuclear nature of chondriosomes. Published results indicating lower pH values for plant nuclei than for animal nuclei are also treated

with marked reserve. Chapter VIII deals with the influence on nuclear division of such factors as temperature, various chemical compounds and hydration. Attention is also given to the changes in physical and chemical properties of the nucleus at different stages of division, and the various theories that have been propounded to explain the mechanism of mitosis: traction, or magnetic, electrostatic, hydrodynamic or autonomous chromosome movement.

Part 2 deals with the chemical composition of the nucleus and its constituent parts, special consideration being given to microchemical methods of analysing them and to the theory of staining in general, and of the nucleal reaction in particular. This is a field in which the writer himself has pursued active researches and a number of remarks are interpolated in the text in clarification or modification of the views expressed by other authors. Much emphasis is placed on the fact that thymonucleic acid has been demonstrated in all plant and animal nuclei so far investigated, including those of unicellular organisms such as trypanosomes, amoebae and infusoria, but never confirmed in nucleoli or chondriosomes. The reactions of other cell inclusions are described separately.

It is unfortunate that the monograph embraces the literature only up to the year 1943, since in a rapidly developing science such as the study of the nucleus this tends to limit its value to that of a reference work on the historical development of the subject.

HUGHES, A.

The mitotic cycle. The cytoplasm and nucleus during interphase and mitosis.

Butterworth's Scientific Publications, London 1952 : 35s. : Pp. viii + 232 : 16 plates : 69 figs. : 7 tables.

This book, as its subtitle defines, is concerned with "the cytoplasm and nucleus during interphase and mitosis." It throws a refreshing and welcome emphasis on the living cell and on the interphase, two aspects which so many cytologists seem almost to ignore. The interphase is here regarded as the period during which the main synthetic activities of the cell occur, and phase-contrast microscopy and other modern techniques have shown that far from being the homogeneous mass it was once thought to be, the interphase nucleus has, like the cytoplasm, a high degree of organization "at the submicroscopic level"; this makes it more possible to envisage the smooth functioning of the many complex metabolic processes, some of them contradictory, which are carried on simultaneously in the living cell.

The review of present knowledge given in this volume, covering such widely debated subjects as the Feulgen reaction and the chemistry of the various cell constituents, the persistence of the chromonemata in the interphase nucleus, the observation of cell division in living organisms, the rhythm of mitosis and the factors affecting it, and the structure and composition of chromosomes, spindle and other bodies, while illustrating the vast amount of effort that has been devoted to their study, rather serves to emphasize the subjectivity of much of this study and the immense uncertainty that remains about many of the phenomena. The author expresses definite reserve about certain subjects in particular, such as the tactoid hypothesis of the spindle, Darlington's "balance theory of mitosis" and the many theories associated with the properties of heterochromatin and the nucleic acids; also the many generalizations that cytologists have tended to make from observations on special, often exceedingly special, cases. Where a particular aspect of the subject has recently been reviewed by some other author the reader is referred to this review, so that the text is not a complete treatise but serves as a useful guide to more extensive reading. Two colleagues of the author, Dr. C. Waymouth and Dr. M. Swann, have contributed part of the text of this stimulating review of an important and neglected aspect of cytological study. The text is supplemented with a set of sixteen plates reproducing photomicrographs of a very high quality. The standard of accuracy of the text and index on the other hand are unusually low for a work of this kind.

ARNON, D. I. (Editor).

Annual review of plant physiology.

Annual Reviews, Inc., Stanford, California, USA 1952 : $6·00 : Pp. ix + 369 : figs. : tables.

The third volume maintains the high standard set by the first two. It contains the following contributions: Factors affecting availability of inorganic nutrients in soils with special reference to micro-nutrient metals, by G. W. Leeper; Glycolytic enzymes in higher plants, P. K. Stumpf; Metabolism of phosphorylated compounds in plants, H. Albaum; Studies of the physiology, pharmacology, and biochemistry of the auxins, J. Bonner and R. S. Bandurski; Agricultural application of growth regulators

and their physiological basis, J. van Overbeek; Transport of organic compounds, W. H. Arisz; Leaf proteins, S. Wildman and A. Jadenorf; Physiological aspects of low temperature preservation of plant products, M. A. Joslyn and H. C. Diehl; Physiology of virus diseases, F. C. Bawden and N. W. Pirie; Mechanisms of ion absorption by roots, R. Overstreet and L. Jacobson; Physiological bases for assessing the nutritional requirement of plants, A. Ulrich; Photosynthesis, E. Rabinowitch; Physiology of flowering, A. Lang; Carboxylating enzymes in plants, B. Vennesland and E. E. Conn; and Tree physiology, B. Huber. Breeders and geneticists interested in physiological aspects will find these authoritative surveys of world literature very valuable guides. Of particular interest in the present volume are the papers by Joslyn and Diehl on low temperature preservation, containing a section on varietal and maturity factors, Lang's contribution on the physiology of flowering, and Huber's Tree physiology which touches upon forest tree breeding techniques and lays stress on the great potentialities of tree breeding.

RABINOWITCH, E. I.
Photosynthesis and related processes. Volume 2. Part I. Spectroscopy and fluorescence of photosynthetic pigments; kinetics of photosynthesis.
Interscience Publishers, Inc., New York 1951 : $15·00 : Pp. xi + 603–1208 : figs. : tables.

It seems that in current American usage the word "turtle" denotes any reptile of the order Chelonia, regardless of whether it is marine or terrestrial, for the author of this book likens its writing to the race "Achilles vs. turtle." Since the appearance of the first volume research on photosynthesis has been greatly intensified, largely as a result of the stimulus of the discoveries made possible by the combination of isotopic tracer and chromatographic techniques, but also, perhaps, because of a growing realization of the part which knowledge of this process might play in increasing the world supply of food and raw materials. Temporary completeness in this second volume has as a result only been achieved at the cost of several years delay and the publication of the volume in two parts, of which this is the first.

This instalment deals only with the spectroscopy and fluorescence of the photosynthetic pigments and the kinetics of photosynthesis, that is, broadly speaking, with the absorption of light energy by plants and the efficiency of its conversion into chemical energy. The evidence reviewed shows that light absorbed by the accessory pigments of the photosynthetic apparatus, i.e. the carotenoids and phycobilins, may be equally available for photosynthesis with that absorbed by the chlorophylls themselves. However, we are still justified in regarding chlorophyll as of paramount importance since it appears that chlorophyll is the only plant pigment concerned in the chemical part of the process and that energy absorbed by the other pigments must be transferred to it before use in the reduction of carbon dioxide. The section on kinetics, besides describing the effects of carbon dioxide concentration and light intensity on the rate of photosynthesis, deals with the vexed question of the maximum efficiency with which plants are capable of converting light into chemical energy. The author considers the evidence fully and critically but leaves the reader to judge between the assertions of those who maintain that as few as four quanta suffice for the reduction of a molecule of carbon dioxide to the reduction level of the carbon in a sugar and those who believe that at least eight quanta are needed for this.

One of the features of this book is the wealth of illustrative material that it contains and it affords a very fair substitute for a collection of original papers on the subjects it covers. Perhaps some of the detail could have been omitted with advantage. The illustration of the Warburg manometric apparatus, for instance, is surely superfluous considering the class of reader for which the book is intended, and the main argument is often obscured in the exhaustive consideration of all possible aspects of a problem.

It is inevitable that much in a book of this type should soon become out of date but Professor Rabinowitch may be assured that his effort has been well worth while, for in this treatise he has provided a comprehensive and critical account of photosynthesis which will be used for many years to come as the foundation for research on this most fundamental of living processes.

G. E. F.

FASSETT, N. C.
Grasses of Wisconsin.
University of Wisconsin Press 1951 : $3·00 : Pp. 173 : figs.

There is no doubt that this relatively slender handbook, which contains the wherewithal for identifying grasses occurring wild in Wisconsin, will be welcomed by the local amateur botanists who may be overwhelmed by A. S. Hitchcock's

standard *Manual of the Grasses of the United States. Grasses of Wisconsin* is based largely on the first edition of the *Manual* (cf. *Plant Breeding Abstracts*, Vol. V, p. 375), employing in most cases the same taxonomy, artificial keys and nomenclature. An introduction outlines the procedure for identifying specimens and explains many morphological terms; these definitions are supplemented by a short terminal glossary. Where possible in the text the botanical descriptions have been simplified and the student is referred to the excellent line illustrations for confirmation. These are reproduced from the *Manual*, with the addition of occasional labels; but whereas illustrations were scattered through the text of the *Manual*, N. C. Fassett has saved space by confining them to a section at the end of the book, where they form a succession of skilfully arranged figures.

The distribution of each species is always indicated in the text and can be followed on a useful map showing the counties of Wisconsin. A more detailed map is given for every species, using dots to represent each locality in which the species in question has been collected. The geology of the state is also briefly described and mapped.

J. C. Curtis has contributed a short chapter on the vegetation of Wisconsin, placing the grasses in their respective ecological backgrounds.

LEDERBERG, J.
Papers in microbial genetics, bacteria and bacterial viruses.
University of Wisconsin Press, Madison, USA 1951 : $3·75 : Pp. xx + 303 : figs. : tables.

In delivering a lecture course on microbial genetics Dr. Lederberg found that in most universities the papers he recommended for supplementary reading were represented only by single copies of the original journals, thus making it difficult for a number of students to consult them at the same time. In almost any other country the lecturer would have remarked how unfortunate that was, and exhorted patience in making the best of a difficult situation. Not so the USA. Photo offsets have been made of the papers the lecturer required, and are published, together with an introduction by Dr. Lederberg, in this attractice volume. The papers chosen have, for practical reasons, been restricted to bacteria and bacterial viruses, and most of them have already been referred to in *Plant Breeding Abstracts* (cf. Vol. XIV, Abst. 486; Vol. XX, Abst. 792; Vol. XIX, Abst. 825; Vol. XXII, Abst. 133; Vol. XXI, Abst. 841; Vol. XVIII, Abst. 2055; Vol. XXII, Abst. 105; Vol. XVIII, Abst. 761; Vol. XIX, Abst. 2406; Vol. XIX, Absts. 1667 and 2436). Dr. Lederberg's introduction provides a useful assessment of the present position of the subject from the standpoint of the neo-Darwinian interpretation. No paper representing the adaptational views of Lindegren or Hinshelwood is included in the collection, though the works of the latter author are referred to in the bibliography which completes the volume. This and indications in the introduction provide the student with a guide for wider and more exhaustive reading.

LILLY, V. G. and BARNETT, H. L.
Physiology of the fungi.
McGraw-Hill Book Company, Inc., New York, Toronto, London 1951 : 64s. : Pp. xii + 464 : 81 figs. : 64 tables.

The superfluous bounty of nature after a time of scarcity is often somewhat embarrassing. Before 1947, not even a comprehensive review paper was available as a guide to the voluminous but scattered literature on fungal physiology. Then in this year appeared the second volume of *The Fungi* by Wolf and Wolf, in which an attempt was made to fill this gap. This was followed in 1949 by Foster's excellent but more restricted work, *Chemical Activities of Fungi*, and in 1950 by Hawker's *Physiology of Fungi*. With the appearance of the last-named, mycologists and plant pathologists at last obtained the comprehensive but compact and readable survey of fungal physiology that they had so long awaited. The volume by Lilly and Barnett now under review covers much the same ground as that traversed by Hawker, and in much the same order, which is merely another way of saying that both books are comprehensive in scope and logical in arrangement. There, however, the resemblance ends, inasmuch as each book is stamped by the individuality of the authors in selection and presentation of data. The earlier appearance of Hawker's book might have "killed" a book less good than this one by Lilly and Barnett; as it is, nobody who has obtained the one should feel less anxious to secure the other also.

A particularly valuable feature of this book is the attention devoted to technique, and especially to considerations determining the correct choice of a method. The excellent discussion of growth measurements on pp. 27–31 is a case in point. On p. 18, in remarking that the volume of culture medium is not the same as that of the water used in its preparation, the authors have drawn attention to a widespread

error in technique. One is glad to see a useful general survey of enzyme action in Chapter 4; in Chapter 8, there is a most lucid exposition of the theory of hydrogen ion concentration and buffer action for the general biologist. Such exposition is a characteristic feature of the best American textbooks; English authors, on the other hand, are all too prone to assume in their readers their own specialized knowledge.

As guinea pigs for physiological research, the fungi offer many advantages; for *ad hoc* use in vitamin assay, they have largely replaced the small laboratory mammals as test organisms. Their rapidly increasing employment for the experimental analysis of fundamental problems in genetics is not surprising; out of this work has arisen the recent development by Beadle and others in the USA of induced biochemical mutants for the study of paths of synthesis for vitamins and aminoacids, which has furnished a new research tool of outstanding promise. These recent developments are briefly reviewed in Chapter 18, which could well be expanded in a later edition.

This book is not only remarkably inclusive, but is also very well up-to-date. The fact that on p. 12 the authors have correctly specified types of nitrogen utilization by *Ophiobolus graminis* (a fungus of notable economic importance as the cause of take-all disease in cereals) is worthy of mention, because of the frequent misapprehension of its nitrogen metabolism on the basis of earlier and faulty work. Amongst some useful generalizations made by the authors, this reviewer's own favourite is that on p. 305: "There is no universal set of conditions which leads to fructification in all fungi." All biologists might well take to heart this "generalization to end all generalizations."

Points for criticism are few, but it seems unwise for the authors to suggest on p. 174 that a preliminary screening test for vitamin deficiencies can be made on agar media, when a test in liquid media is just as easy to carry out and much more convincing. On pp. 103–4, the paper by Brian, Curtis and Hemming (1947) is quite correctly quoted in every respect, but a fuller account would have benefited the reader not previously acquainted with this important work. These, however, are but trivial criticisms offered by the reviewer as a pledge of good faith, in lieu of typographical corrections, of which only one was noted. The mere absence of errors, however, is but the least virtue of this book, in which two authors of wide research experience have done full justice to their subject.

S. D. G.

MARTIN, G. and COOK, E. I.
Industrial and manufacturing chemistry. Part I. Organic.
The Technical Press Ltd., London 1952 : 7th ed. : 90s. : Pp. xxi + 752 : 240 figs. : 4 tables.

Condensation of information on a vast field of processing and manufacturing, which comprises the organic division of Britain's chemical industry, results in a hefty well-bound volume. The text is divided into 24 sections, many containing contributions of specialists; sections on starch, cellulose, textiles, sugar, tobacco, rubber, oils, pigments, tannins, drugs and gums are among those which deal with plant products; the species commonly used are indicated and chemical data are given on techniques by which products are manufactured, their physical properties and uses. Other sections of possible interest to readers of *Plant Breeding Abstracts* include those on fermentation, synthetic stains and modern synthetic drugs. Since 1922, when the sixth edition appeared, many manufacturing methods have been improved and far reaching changes, such as the discovery of new drugs and development of the plastics industry, have necessitated thorough revision to the extent of completely rewriting some chapters and including totally new sections; some sections have been brought up to date by terminal additions so that they form an historical survey. In any case the concise treatment which is necessary to confine the wide range of information to a single volume narrows the scope of each subject. No chapter is claimed to be invaluable to an expert in that particular subject, but the whole survey can be recommended to those wishing to enlarge on their knowledge of subjects other than their own and of the organic chemistry of industry in general.

JONARD, P.
Les blés tendres (*Triticum vulgare* Vill.) cultivés en France. [**The soft wheats (*T. vulgare* Vill.) cultivated in France**].
Institut National de la Recherche Agronomique, Paris 1951 : Pp. 491 : 32 figs. : 39 tables : 15 plates.

Introductory sections give an outline of the work of previous authors on the classification of wheat varieties, botanical and agricultural, and of the genetic origin of the present French wheats. It is shown that only a limited number of parents, eight in all, have gone to make up their pedigree; the variety Noé occurs in the parentage of 99% of the present-day French

wheats. This accounts for the great resemblance between them and the difficulty of finding diagnostic characters to distinguish between them. Two extensive chapters are devoted to descriptions and illustrations of the characters, morphological and physiological, of the ear and growing plant used, after which a diagnostic key to the varieties is presented, followed by tabular descriptions of the individual varieties, giving their origin, producer, synonyms and principal characteristics, starting with morphological features of the ear and its parts, then vegetative characters and finally physiological characters, including resistance to disease and other adversities, earliness, tillering, baking quality and region of adaptation. A number of photographic plates illustrate the ears and an alphabetical index to the varieties is provided.

FINAN, J. J.
Maize in the great herbals.
Chronica Botanica Co., Waltham, Mass., and Wm. Dawson & Sons Ltd., London 1950 : limited ed. : $3·00 : Pp. xiv + 191 : 25 figs. : 4 tables.

Mr. Finan's treatise on the references to maize in the literature of exploration and in the herbals of the sixteenth and seventeenth centuries, and the light they throw on the problem of the early introduction of this plant into Europe first appeared in 1948 in the *Annals of the Missouri Botanical Garden* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 284). It is a pleasure to draw attention to the publication of a handbound, limited edition of this informative and often entertaining excursion into the past. Mr. Finan's scholarly examination, and the extracts from the literature, with their strange amalgam of quaint credulity and exact observation, combine to make an interesting and unique study, and for visual delight there are reproductions from the original woodcuts. Dr. E. Anderson, the well-known American authority on maize, contributes a foreword.

BOYLE, P. J.
Fodder-beet.
Commonwealth Agricultural Bureaux, Farnham Royal 1952 : Mim. Publ. No. 1/1952 : 5s. : Pp. 78 : tables.

Fodder beet, compared with mangolds and sugar beet, is relatively a newcomer to agriculture in Europe. In the 1930's it was introduced into general farming in Scandinavia and the Netherlands, and since then a great deal of work has been done in these countries on the development and improvement of fodder beet varieties both by private and government institutions, and the farmer has come to rely more and more on fodder beet as his main source of fodder for cattle, horses and pigs, especially as it produces a higher output of starch equivalent per acre than any other fodder crop. Considerable interest in fodder beet now exists in Britain; the publication of a detailed survey of information on this crop is therefore timely. The review contains the following main sections: origin and nature; classification and nomenclature; fodder beet in Europe; varieties; cultivation; seed production, including vernalization experiments; breeding; chemical composition and nutritive value; and fodder-beet as stock feed. It concludes with an annotated bibliography, arranged in chronological order within each country. The account of varieties provides a valuable synthesis of available data on the characteristics and performance of varieties in Denmark, Sweden and the Netherlands. The survey of production in the different countries discusses the results of preliminary trials in Britain and the possible significance of the crop in British agriculture. No attempt has been made to give a detailed account of breeding, since the bulletin is mainly concerned with aspects of practical production; the brief section on breeding only outlines methods used in Denmark. All those interested in the production and value of this crop will find the review an essential source of reference.

SNELL, K.
Die zugelassenen deutschen Kartoffelsorten. (**The recognized German potato varieties**).
Paul Parey, Berlin 1952 : 11th ed. : 4·20 DM : Pp. 70 : 35 illus.

The first section of this useful manual describes the characters on which the varietal distinctions are based. These include morphological features of the tuber, leaf and stem, the particular characteristics of the sprouts germinating in light, ripening time and various agricultural and culinary qualities. Next come descriptions of the German varieties, arranged in alphabetical order, in which the origin, date and main characteristics of each variety are indicated. There are also lists of the varieties whose cultivation is sanctioned in the Federal Republic and the Democratic Republic respectively; a list of the varieties possessing particular properties such as flesh, skin and flower colour, resistance to various diseases, starch content and suitability for crisp making; and finally

the main potato breeding concerns in Germany and the varieties they have issued.

DIJKMAN, M. J.
Hevea. Thirty years of research in the Far East.
University of Miami Press, Florida, USA 1951 : $6·00 : Pp. xxii + 329 : 116 figs. : 93 tables.

During recent years rubber planting in the Western Hemisphere has received a new impetus, since, with the gradual disappearance of Far Eastern sources as the result of the increasing demand by Asiatic countries, the United States is seeking other sources of supply of natural rubber. At present, however, scientists and growers in the Americas have to rely upon planting material for top budding from the Far East and also largely on research experience gained in the East, until clones are developed which combine the leaf blight resistance of native selections with superior yield. Dr. Dijkman's review of thirty years' rubber research in the Dutch East Indies until its sudden stoppage in 1941 by Japanese occupation has been compiled in response to this situation. After an account of the early history of rubber, its introduction to the Far East, its role in the economic expansion of this region, and of the development of rubber research in the Netherlands Indies, a critical survey is given of fertilizing and soil management; planting material; growth; tapping systems; the mechanism of production and related phenomena; growth, yield and disease in relation to planting density; diseases and pests; techniques of vegetative selection; procedures of generative selection; results of mother tree selection; experimental results with vegetative and generative selections; clones and selected seedlings under commercial conditions; and ecology in relation to rubber improvement. The text is supplemented by numerous line drawings, photographs, tables and graphs. Appendixes provide a glossary, and information on net exports of crude rubber, composition of the areas under rubber in the main centres of production in the Far East, descriptions and figures of the best commercial Far Eastern clones, and the production of historically and commercially important primary and secondary clonal and selected seedling families in test areas in Indonesia. Dr. Dijkman writes authoritatively, with the background of 13 years' experience on breeding and other aspects of *Hevea* improvement at the West Java Experiment Station, Buitenzorg (now Bogor), and his comprehensive survey of the widely scattered literature, most of which is in Dutch, will be welcomed by all those interested in rubber production.

GRAM, E. and WEBER, A.
Plant diseases in orchard, nursery and garden crops.
MacDonald & Co. Ltd., London 1952 : 90s. : Pp. 618 : 349 figs. : 10 plates.

Most of the English manuals on plant pathology are inclined to be written for the student, making an academic rather than practical approach to the subject. Growers will therefore be particularly interested in this addition to literature on plant diseases since it is intended primarily for themselves. The information was compiled by pathologists with an international reputation, who have been associated for many years with the experimental station at Lyngby, Denmark. Although it is therefore based on experience obtained in Denmark, and was originally written for Danish readers, little if any of the book's value has been lost in the English translation, since this has been edited and adapted for British conditions by Dr. R. W. G. Dennis, a practising plant pathologist attached to the Royal Botanic Gardens, Kew. Thus it is obvious that authors and editor have had ample opportunity for observing the effect of diseases in practical horticulture and are well-acquainted with many of the problems confronting growers.

Simple keys for diagnosing diseases of individual crops are a special feature of the book, and numerous line illustrations supplemented by photographs and coloured plates have been chosen to facilitate recognition of the diseases rather than to give details of associated fungi; emphasis on prevention and control is found throughout. A preliminary section outlines general principles and gives information necessary for an understanding of control methods. A few diseases common to a large number of crops are described, followed by sections dealing with individual crops arranged alphabetically in three groups: tree and bush fruit; vegetables and herbaceous fruits; and ornamental plants and trees. A final section is concerned with control measures. Each section has a bibliography and there is a terminal index of diseases.

The book has proved very popular in Denmark, where a second edition was brought out within four years of the first publication. It is so excellently produced and contains so much information that perhaps one should not be

surprised by the price; this however is likely to limit its practicability in spite of the fact that it is described as a "practical book for practical people."

The world of learning.
Europa Publications Ltd., London 1952 : 4th ed. : 80s. : Pp. xii + 952.

The fourth edition of this deservedly well-known guide to the educational, scientific and cultural organizations throughout the world and the names of their leading personnel contains about twice as many pages as the original edition published in 1947 (cf. *Plant Breeding Abstracts*, Vol. XVII, p. 348) and the two intervening editions. A section is now included which provides information on UNESCO, the International Council of Scientific Unions, and other international organizations. As before, the information on academies, learned societies, research institutions, libraries and archives, museums and art galleries, universities, colleges and technical institutes is arranged alphabetically according to countries. In the first edition only 53 countries were included; this edition lists 73. Not only have countries been added but the information for countries previously represented has been expanded. An index of institutions now completes the guide. An index of names is in the course of preparation and will shortly be published separately. The editors are to be congratulated on the production of this greatly improved edition.

NEW JOURNAL

Euphytica

Euphytica, the *Netherlands Journal of Plant Breeding*, has been published with the aim of conveniently describing under a single cover work carried out by Dutch breeders and geneticists not only on agricultural, horticultural and ornamental plants in the Netherlands, but also on tropical crops in Indonesia. Occasionally foreign scientists will be invited to make contributions. Useful summaries are also to be given of papers read at the meetings of the Netherlands Study Centre of Plant Breeding. J. C. Dorst contributes a short introduction to the first number, discussing the significance of modern breeding, both as a science and an art sustained by the "breeder's eye." Twelve articles follow, dealing with a wide range of topics; these have been abstracted separately in this number of *Plant Breeding Abstracts*. Some of the articles are published in English with Dutch summaries; others appear in Dutch with English summaries. English abstracts of relevant articles from Dutch periodicals are provided. Book reviews, news items on breeders and geneticists, and notes on such matters as new departments and organizations, written mostly in English, complete the first number. Further information may be obtained from the Managing Editor, Dr. H. de Haan, Nude 66, Wageningen, Netherlands. It is hoped to publish three issues annually. The subscription rate per annum is 15 guilders (approximately $4·00) in foreign countries.

INDEX

Afifi, A., 2625
Agati, G., 3035
[Ahmed Samsul Islam], 2537
Aĭzenštat, Ja. S., 3057–8
Akeley, R. V., 2824
Åkerberg, E., 2786, 3088
[Åkerman, Å.], 2563
Alcaraz Mira, E., 2889
Alekseenko, A. I., 2800
Alexander, D. E., 2689
Allard, R. W., 2376
Alonso Olivé, R., 2988
Altenbern, R., 2495
Amelung, J., 2534
Anderson, J. A., 2710
[Anderssen, F. G.], 2541
Andersson, G., 2922
André, É., 2852, 2929
Andrew, W. T., 3036
Anon, 2365, 2410, 2445, 2465, 2528–31, 2535–58, 2561, 2563, 2567–69, 2573, 2613, 2622, 2650, 2654, 2656, 2661, 2666, 2680, 2683, 2691, 2695–7, 2708, 2716, 2724, 2726, 2735, 2738, 2748, 2790, 2801, 2806, 2836, 2838, 2850, 2864, 2868, 2870, 2876–7, 2899, 2904, 2914, 2926–7, 2945, 2950, 2952, 2959, 2977, 2981, 2999, 3016, 3020–1, 3023, 3050, 3079, 3090, 3094, p. 635
[Anson, R. R.], 2836
Antunes Filho, H., 2909
Armstrong, J. M., 2787
Arnon, D. I., p. 629
[Asana, R. D.], 2538–9
Austrian, R., 2472
Azab, Y. E., 2874–5

Bailey, N. T. J., 2364, 3064
Bailey, W. K., 2983
Bajer, A., 2432, 2440, 2442
Baker, H. G., 2425
Baker, R. E., 2995
Balasubrahmanyan, R. [2538], 2844
Baldacci, E., 2576
Ballard, W. W., 2848
Bandyopadhyay, K. S., 2869
[Banerji, I.], 2539
Banta, E. S., 2960
Barber, H. N., 3087
Barigozzi, C., 2428
[Barlow, K. C.], 2836
Barnard, C., 2457
Barnett, H. L., p. 631
Bartlett, H. H., 3010
[Basudev Roy], 2538
Batchelor, L. D., 2974
Bauman, L. F., 2689
Baumgarten, G., 2600
Bayles, B. B., 2579
Bazavluk, V., 2596
Begg, M., 2420
Bendelow, V. M., 2714
Benne, E. J., 2672
Bensin, B. M., 2717
Bercks, R., 2830
Bergal, P., 2706
Bertrand, D., 3004
Bertrand, G., 3004
Bethke, R. M., 2675
Bever, W. M., 2630
[Bhaduri, P. N.], 2537
[Bhat, N. R.], 2538
Bhattacharya, S. C., 2969
Bingefors, S., 2785
Biraghi, A., 2977–8
Bishop, C. J., 2436
Bitancourt, A. A., 2972
Black, W., 2823
Blaringhem, L., 2404, 2586, 2673, 2924, 2963
Blood, H. L., 3063
Blum, H. F., p. 628
Boceta Durán, V., 2648
Boev, N. D., 2920
Bogdanova, E. N., 3056
[Bøgh, H.], 2563
Bogomjagkov, S., 2644
Boivin, A., 2430, 2480
Bolsunov, I., 2887
[Bolton, J. L.], 2748
Bonnett, O. T., 2630
Bonnier, G., 2437
Boock, O. J., 2816
Borzini, G., 3067
[Bose, S.], 2537
Bóttari, V., 2966
[Bouriquet, G.], 2563
Bowman, G. F., 2911
Box, G. E. P., 2369
[Boyes, D.], 2529
Boyes, W. W., 2962
Boyle, P. J., p. 633
Boza, B., T., 2837
Bradshaw, A. D., 2758
Brady, J. J., 2627
Braun, W., 2477, 2490, 2495
Brewbaker, H. E., 2883
Briggs, F. N., 2583
Bringmann, G., 2429
Brittingham, W. H., 3072
Brix, K., 2419
Brooks, J. S., 2664
Brooks, O. L., 2684
Brooks, R. M., 2944
Brown, C. H., 2840
Brown, M. S., 2839
Browne, E. B., 2684
Bufton, A. W. S., 2508
Bukarev, B. M., 2618
[Bunting, A. H.], 2541
Burdick, A. B., 2687, 2928
[Burkhart, B. A.], 2697, 2708
Burton, K. A., 2521
Burtt, B. L., 2426
Bush, H. L., 2883
Butler, L., 3053
C., A., 3018
Calavan, E. C., 2974
Caldecott, R. S., 2702
Câmara, A., 2594, 2597
Camp, W. H., 2770
Camus, A., 2731
Capinpin, J. M., 2742
Caracciolo, C., 2895
[Cardon, P. V.], 2563
Carew, J., 3041
Carlone, R., 2954
Carlsen, H., 2533
Carnahan, H. L., 2780
Carpentier, S., 2982
Carrante, V., 2966
Carter, J. F., 2766
Carvalho, A., 2907–8
Cash, L. C., 2824
Caspari, E., 2395
Caspersson, T., 2391
[Chakravorti, A. K.], 2537
Chandnani, J. J., 2856
Chase, S. S., 2669
Chatterjee, D., 2856
[Chavan, V. M.], 2538
Chen, Y. T., 2741
Chevalier, A., 2403, 2405–9, 2937, 3019
Chilton, S. J. P., 2867, 2874–5
Chin, K.-C., 2586
Chiu, S.-F., 2747
Chodat, F., 3051
Chouard, P., 2994
[Chowdhury, B. B.], 2538
Christensen, C. M., 2504
Christensen, J. J., 2504
Ciccarone, A., 2734, 3062
Ciferri, R., 2576
Clapp, A. L., 2690
Clapper, R. B., 2979
Clarke, M. F. [2748], 2757
Clarke, N. A., 2500–1
Clarke, P. M., 2370
Clausen, J., p. 627
Clausen, R. E., 2902
Cockerham, K. L., 2834
Compton, W., 2443
Conagin, A., 2374
Conover, R. A., 3061
Conroy, R. J., 3066
Cook, E. I., p. 632
Cook, R. L., 2718
Coolhaas, C., 2886
[Corkill, L.], 2563
Costa-Rodrigues, L., 2655
Covas, G., 2700–1
Cowan, P. R., 2711
Cowgill, W. H., 2940
Cowles, P. B., 2500
Cox, D. R., 2366
Cramer, P. J. S., 2862
Crane, M. B. [2530], p. 626
Crane, P. L., 2688
Crowe, L. K., 3042

Cuany, R. L. [2836], 2843
Čudars, M., 2783
Culbertson, J. O., 2851
Currence, T. M., 3055
Curtis, J. J., 2670
Cushing, J. E., 2510
Cutler, G. H., 3075
Cuzin, J. L., 2893

Danell, N., 2853
Dangeard, P., 2431
Danielli, J. F., 2438
Danjšin, T. E., 2599
Darlington, C. D., 2383, [2530]
Darmer, G., 2804
David, H. A., 2367
Davidson, J. F., 2773
Davies, E. W., 2462
Davis, B. D., 2483
Davydovič, S. S., 2729
Day, W. R., 3015
Decker, P., 2797
Decker, R. E., 2660, 2676
de Cugnac, A., 2749, 2763
de Haan, H., 2417, 2560
DeLamater, E. D., 2481–2
de Litardiére, R., 2759–61, 2776–8
Dennis, R. W. G., 2524
[Deodikar, G. B.], 2538
Dermanis, P., 2756
Dermen, H., 2955, 2958
Derscheid, L. A., 2725
[Deshmukh, V. K.], 2539
de Sornay, A., 2861, 2865
de Turk, E. E., 2674
Deufel, J., 2416
de Villiers, D. J. R., 2962
de Vos, W. H., 2803
Deysson, G., 2451, 2453–4, 2458–9
Deysson, M., 2447
Dick, J. B., 2845
[Dickson, A. D.], 2697, 2708
Dickson, J. G., 2766
Dieng, F., 2514
Dijkman, M. J., p. 634
Dirks, V. A., 2699
Dmitriev, V. S., 3091
Dobzhansky, T., p. 627
Dodson, E. O., p. 626
Dorman, K. W., 3024
[Dorst, J. C.], 2563
[Douwes, H.], 2836
Down, E. E., 2660, 2676, 2718
Dšk, 2620
[Duck, K. D.], 2410
Duckelman, P. H., 2867
[Ducker, H. C.], 2836
Dulbecco, R., [2410], 2496–7
Dungan, G. H., 2630
Dunn, L. C., p. 624
du Plessis, S. J., 2624
Duraiswami, S., 2518, [2538]
Dutt, M., 2921
[Dutt, N. L.], 2537, 2539
Dutta, S., 2969
Dvadcatova, E. A., 2506

Eagle, H., 2492, 2494
Earhart, R. W., 2637
Earley, E. B., 2674
Ebes, K., 2939
Eckhardt, R. C., 2662
Édouard, P., 2451
Einset, J., 2949
Eljčaninova, N. N., 2775
Ellerton, S., 2617
Engelbrecht, L., 2855
Englerth, G. H., 3030
Englesberg, E., 2486
Enin, T. K., 2591
Ephrussi, B., 2396
[Erlanson, C. O.], 2563
Ernst, A., 2389
Esnault-Pelterie, R., 2399–401
Evans, A. T., 2450

Fajersson, F., 2582
Fardy, A., 2888, 2893–4
Fassett, N. C., p. 630
Feaster, C. V., 3080
Feekes, W., 2584
Feistritzer, W., 2811
Fenaroli, L., 2692
Feniksova, P. V., 2506
[Feniksova, R. V.], 2515
Fernandes, A., 2424
Fesenko, N. V., 2799
Finan, J. J., p. 633
Fischnich, O., 2819
Fisher, R. A., 2360
Flanagan, T. R., 2795
Fleischman, R., 2494
Fogle, H., 3055
Forbes, I. (Jun.), 2772
Ford, R. F., 2928
Forlani, R., 2576
Fortmann, H. R., 2780
Fowler, T. E., 2951
Fox, D., 2627
[Francis, H. A.], 2836
[Frankel, O. H.], 2563
Freeman, V. J., 2499
Freeman, W. H., 2684
French, A. P., 2965
Frey, K. J., 2718
Friedman, S., 2473
Fröier, K., 2917
Frolik, E. F., 2671
Frolov, P. V., 2920
Fulton, R. W., 3074
Fyfe, J. L., 3064

Gaevskaja, I. G., 2881
Gagnebin, F., 3051
Gagnieu, A., 2953
Garber, R. J., 2752
Gardé, A., 2423
Gasiorkiewicz, E. C., 3037
Gassner, G., 2600
Geerdes, J. D., 2612
Gehbauer, F., 2967
Gelin, O. E. V., 2640, 3093
Gentner, L. G., 2781
Genevois, L., 2523
Ginsburg, L., 2962
[Giordano, H. J.], 2465
Gisquet, P., 2892
[Glover, J.], 2541
Glushchenko, E., 2381
[Gokhale, V. P.], 2538
González Rios, P., 3065
Goodlow, R. J., 2477, 2490, 2495
[Goulden, C. H.], 2563
[Govindaswami, S.], 2538
Grafius, J. E., 2699
Gram, E., p. 634
Grandjean, F., 2402, 2421–2
Granhall, I., 2946
Grassl, C. O., 2866
[Gray, L. H.], 2410
Greenberg, B. G., 2371
Grehn, J., 3012
Grillot, M. G., 2739
Grimball, E. L. (Jun.), 3070
Grindrod, J., 2885
Grümmer, G., 2916
Grun, P., 2754
Grunder, M. S., 2756
Guinochet, M., 2802
Guyot, L., 2525, 2575

Hagberg, A., 2387, 2798
Halais, P., 2863
Haldane, J. B. S., 2398
Hall, H. H., 2670
Hamming, G., 2373
Hamy, M. A., 2372
Hanson, A. A., 2461, 2752, 2755, 2791
Hanson, R. G., 2791, 2793
Hare, W. W., 3073
[Harper, A. S.], 2836
Harris, R. H., 2612
Harrison, P. K., 2834
Harrison, T. J., 2712
Hartley, H. O., 2368
Hartmair, V., 3038
[Hasanain, S. Z.], 2563
Hawk, V. B., 2762
Hawkes, J. G., 2808–9
Hawkins, B. S., 2848
Hay, W. D., 2933
Hayes, W., 2474
Healy, M. J. R., 2375
Hebert, T. T., 2678
Hedberg, O., 2750
Heinisch, O., 2804, 2993
[Heinrichs, D. H.], 2748
Heiser, C. B. (Jun.), 2931
Hemmons, L. M., 2508
[Hendrix, J. W.], 2563
Henry, P., 2935
Hérisset, A., 2923, 2925
Hijner, J. A., 2805
Hintze, S., 3039
Hitier, H., 2888, 2894
Hiura, U., 2721
Hmelev, B. I., 2642
Hobdy, C. J., 2493
[Hodges, D. J.], 2528
Hoffmann, G., 2821
Hoffmann, W., 2854
Hohl, K., 2439
Hohlačeva, N. A., 3046
[Hollaender, A.], 2410
Hollis, J. P., 2488
Homenko, A. A., 2651
[Hopkins, J. C.], 2541
Hopp, H., 2940
Höppner, E., 2818–9, 2831
Horne, F. R., 2709
Horošavina, A. M., 3056
Hough, L. F., 2961

Houtzagers, G., 3008
Howard, H. W., 2810
Howlett, F. S., 2951
Hrynkiewicz, A. Z., 2440
Hughes, A., p. 629
[Hughes, L. C.], 2836
Hunt, C. H., 2675
Hunter, M. E., 2481–2
Hutchinson, A. O., 2707
[Hutchinson, J. B.], 2836
Hutton, E. M., 2829

[Ierusalimskiĭ, N. D.], 2515
[Imšeneckiĭ, A. A.], 2515
Isaija, B., 2895
Ives, P. T., 2450
Ivy, H. W. (Jun.), 2685
Izquierdo Tamayo, A., 2889

Jacobs, K. F., 2740
Jacques-Félix, H., 2633
Jaeger, P., 2455
Jähnl, G., 2832
Jakubciner, M. M., 2589
[Jambunathan, M. V.], 2539
[James, R. W.], 2836
[Jameson, J. D.], 2836
Janson, B. F., 3096
Jenkins, M. T., 2679
Jensen, N. F., 2698
Jinks, J. L., 2507
John, G. A., 3049
Johnson, A. A., 2698
Johnson, A. G., 3027
Johnson, G., 2822
Johnson, L. P. V., 2694
Johnson, R. T., 2880
Jonard, P., p. 632
Jones, I. K., 2581
Jones, M. D., 2733
Jordan, D. C., 2470
Jucci, C., 3052
Judanov, I. M., 2623
Jugenheimer, R. W., 2689
Julén, G., 2764
Junkins, S. C., 2578

[Kamat, M. N.], 2538
[Kanitkar, U. K.], 2539
Kann, E. E., 2475
Kaplan, R. W., 2415
[Kar, A. K.], 2538
Karapetjan, V. K., 2590
Kaule, P. W., 2984–5
Kekuh, A. M., 2826
[Keller, W.], 2563
Kelman, A., 2678, 2897
[Kelner, A.], 2410
Kempthorne, O., p. 624
Kennard, W. C., 2996
Kesava Iyengar, N., 2844
Khanna, K. L., 2869
Kiffmann, R., 2796
Kihara, H., 2595, 3045
Kihlman, B., 2449
[King, H. E.], 2836
Kinman, K. L., 2667
Kiričenko, F. G., 2605
[Kirjjalova, D. N.], 2515
[Kishore, H.], 2538
Kizima, P. N., 2629
Kjeldgaard, N. O., 2411
Klauss, M. L., 2804
Klinkowski, M., 2821
Ključareva, M. V., 2608
Knape, P., 2825
[Knight, R. L.], 2836
Knight, W. E., 2794
[Knowles, R. P.], 2748
Koehler, B., 2689
Kofoed, A. Dam, 2566
Kogane-Charles, M., 2852
Kolbe, F., 2803
Kølmark, G., 2509
Korčenjuk, Ja. T., 2727
Kornilov, A. A., 2611
Kornilov, A. S., 2636
Koroleva, N. Ju., 2631
Kosarev, M. G., 2779
Kosikov, K. V., [2515], 2516
Kotljarenko, M. P., 2512
Kraft, M., 2495
Kratochvil, D. E., 2725
Kronenberg, H. G., 2989
Krug, C. A., 2907–9
[Kugler, W. F.], 2465
Kuljčickiĭ, A. V., 2592
[Kumar, L. S. S.], 2538
Kunkel, L. O., 2526
Küppers, G. A., 3031
Kuzjmin, A. Ja., 2991, 3001
Kvasnikov, E. I., 2515

Ladish, H. N., 2715
Lal, K. N., 2871–2
Lamb, B., 2949
Lamm, R., 3060
Lamprecht, H., 3083–4
Lana, E. P., 3048
Lana, I. P., 3054
Landrum, B., 2659
Lane, G. R., 2446
Langenbuch, R., 2828
Langner, W., 3022
Larkin, R. A., 2789
Larson, R. H., 3037
Latčenko, V. N., 2705
[Laubscher, F. X.], 2541
Laughnan, J. R., 2385
Laya, S., 2459
Lawrence, W. J. C., p. 626
Lebedeff, G. A., 2684
Lederberg, E. M., 2498
Lederberg, J., 2498, p. 631
Leichsenring, J. M., 2814
Leinjš, *see* Lejiņš
Lejiņš, P. Ja., 2948
Lesins, K., 2786
Levadoux, L., 3006
Levan, A., 2381, 2460
Levy, M., 2494
Lewin, R. A., 2412
Lewis, D., [2530], 3042
Li, C.–S., 2747
Lilly, V. G., p. 631
Lima-de-Faria, A., 2639
Lindegren, C. C., 2519
Lindgren, R. M., 3009
Little, E. L., 3024
Litzenberger, S. C., 2717
Liu, L. V., 2741
Lochrie, J. V. [2836], 2841
Løfting, E. C. L., 3028
[Loginova, L. G.], 2515
Love, H. T., 2940
Lu, Y. C., 2746
Luippold, H., 2446
Luna Ercilla, C. A., 2859
Lüning, K. C., 2437
Luppova, V. P., 2812
[Luria, S. E.], 2410
Luteraan, P. J., 2514
Lwoff, A., 2502

[MacDonald, D.], 2836
McDonough, E. S., 2433
McElroy, W. D., 2413, 2473, 2510
McGregor, J., 2489
McGregor, W. G., 2933
MacLean, J. A. R., 2912
[McKinstry, A. H.], 2836
McRostie, G. P., 2713
McVeigh, I., 2493
Magnaye, A. B., 2742
[Mahalanobis, P. C.], 2538
[Maheswari, P.], 2538
Maĭsuradze, N. I., 2970
Malaguti, G., 2734
Malan, E. F., 2998
Malheiros-Gardé, N., 2423
[Malkhani, T. J.], 2538
Mangelsdorf, P. C., 2427
[Mani, V. S.], 2539
[Manning, H. L.], 2836
Manton, S. M., 2379
[Marchbank, D. F.], 2410
[Marciote, C. V.], 2465
[Marloth, R. H.], 2541
Marquardt, H., 2448
Marsh, V. L., 2753
[Martin, F. L.], 2410
Martin, G., p. 632
Martín, G., 3032
Martin, L., 2361
Marušev, A. I., 2614
Massacesi, A., 2987
Massenot, M., 2525, 2575
Matsumura, S., 2580
Maxwell, M. E., 2505
Mazoti, L. B., 2668
Mead, D., 2495
Mecartney, J. L., 2996
Medina, J. C., 2858
Medvedev, P. F., 2643
Medvedeva, G., 2596
Mehrotra, O. N., 2871–2
[Meĭselj, M. N.], 2515
Melville, R., 2388
Mendes Conagin, C. H. T., 2434–5
Mendes, J. E. T., 2907
Menzel, M. Y., 2839
Meredith, W. O. S., 2710
Miège, J., 2884
Mika, L. A., 2477
Miles, S. R., 2688
Miller, M., 2510
Miller, P. A., 2663
Milovidov, P. F., p. 628
Minkevič, I., 2377
[Misra, G.], 2539
Mitchell, W. G., 3082
[Mitra, J.], 2537
[Mitra, K. K.], 2538

Mjagkov, N. V., 2730
Moe, G. G., 2788
Mohn, N., 2433
Molè-Bajer, J., 2441
Monin, A., 2964
Montaldo, A., 2827
Montégut, J., 2575
Moore, J. F., 3055
Moorthy, B. R., 3078
Moos, W. S., 2469
Moran, C. H., 2578
Morettini, A., 2987
Morse, I. U., 2499
Mortensen, J. A., 3072
Mothes, K., 2855
Mou, T. S., 2741, 2745
Mudd, S., 2479
Mudra, A., 3047
Mukerji, A. K., 2615
Mukherjee, S., 2976
Muller, C. H., 3011
Mullin, J., 2627
Munger, H. M., 3041
[Munro, J. M.], 2836
Müntzing, A., 2381
Muromcev, S. N., 2468, [2515]
[Murray, B.], 2748
Myers, W. M., 2751–2

Nachtsheim, H., 2380
[Nanjundayya, C.], 2539
Narasimhamurthy, G., 2842
Narasimhaswamy, R. L., 2910
[Nath, P.], 2537
Nedeševa, G. N., 2602
Nej., 2942
[Nelder, J. A.], 2529
Nelson, O. E. (Jun.), 2681
Nelson, R. T., 2883
Nelson, W. L., 2699
Nesterova, T. T., 2930
Neumann, D., 3047
Nevzorov, V. V., 2618
Newcombe, H. B. [2410], 2489
Newman, J. E., 2688
Nežincev, I. P., 2657
Nielsen, E. L., 2771
[Nilsson-Leissner, G.], 2563
Niščiĭ, I. A., 2705
Nishikado, Y., 2721
Nixon, R. W., 2986
Norden, A. J., 2672
Norman, A., 2485
Nortjé, J. H., 2624
Nürnberg-Krüger, U., 2638
Nusbaum, C. J., 2898
Nuttonson, M. Y., 2466
Nuždin, N. I., 2641
Nybom, N., 2463

Oehler, E., 2572
Oehlkers, F., 2397, 2414
Ognev, I. M., 2378
Ohlendorf, A., 2587–8
Oka, H., 2746
Oke, J. G., 2774
Oldemeyer, D. L., 2461
Oldemeyer, R. K., 2883
Olmo, H. P., 2944
O'Mara, J. G., 2598
[Orellana, A. R.], 2563
Ossewaarde, J. G., 2857
Ostenfeld, H. B., 2878
Ovčinnikov, N. N., 2604
Ozolin, G. P., 3017

Page, L. A., 2490
Paiva Neto, J. E., 2816
Pal, B. P., [2537], [2563], 2626
Palamarčuk, A. S., 2564
Palamarj, N. S., 3095
Paliatseas, E., 2867
Palkina, N., 2609
Palleroni, N. J., 2519
Panasjuk, M. I., 2957, 2990
Papazian, H. P., 2467, 2503
[Parkinson, A. H.], 2529
Parkman, S. B., 2684
[Parthasarathy, N.], 2538
Pass, H., 2664
Passecker, F., 2464, 2947
[Patel, M. K.], 2538
Paton, D. M., 3087
[Paul, A. K.], 2539
Pavlov, B. Ja., 2677
Peak, A. R., 2829
[Peake, R. W.], 2748
[Peat, J. E.], 2541, 2836
Peay, W. E., 3063
Peive, *see* Peĭve
Peĭve, Ja. V., 2532, 2948
Pendleton, J. W., 2630, 2646
Perret, J., 2471
[Peters, R. W.], 2836
Peynaud, E., 2522–3
Pfeiffer, R., 2577
[Philips, J.], 2541
Picco, D., 3067
Pini, P. L., 2784
Pisarev, V. E., 2632
Pittenger, T. H., 2671
Poehlman, J. M., 2719
Pogliaga, H. H., 2890
Politis, J., 2392–4
Pomeroy, K. B., 3026
Pomogaeva, A. I., 3092
Ponce, J. R., 3003
Pontecorvo, G., 2508
Pope, D. T., 3041
Popov, A. V., 2882
Popov, G. I., 2728
Portères, R., 2382
Potuljnickiĭ, P. M., 2941
Probst, A. H., 3075
Puzzilli, M., 2891, 2896

Quayle, W. L., 2647
Quinby, J. R., 2732
[Quisenberry, K. S.], 2697

Rabinowitch, E. I., p. 630
[Rai, J. N.], 2538
Ramanathan, K., 2743
[Ramaswamy Mudaliyar, V.], 2538
[Ranganathan, B.], 2538
[Ranguswami, K.], 2537
Rankin, H. W., 2835
Rao, K. S., 2842
Ravin, A. W., 2484–5
Rebischung, J., 2767
Rees, H., 2452
Rehm, S., 3043
Reinach, O., 2938
Reynard, G. B., 3059
Rhoades, M. M., 2652
Ribereau-Gayon, J., 2522–3
Richharia, R. H., 2860
Riedl, W. A., 2647
Rincker, C. M., 2647
Riollano, A., 3065
Rjadnova, I. M., 2980
Rjurikov, N. A., 2593
[Robb, W.], 2563
Robert, A. L., 2679
Roberts, C., 2511, 2520
Robertson, A., 2390
Robertson, L. S., 2718
Rodriguez, L. D., 2675
Rogler, G. A., 2771
Romberg, P. F., 2773
Rosanoff, E. I., 2491
[Rose, M. F.], 2836
Ross, H., 2807
Rossi, U., 2895
Rossman, E. C., 2660, 2672, 2676
Rousseau, M., 2693
Rovskiĭ, B. M., 3017
Rowan, M., 2433
Rowley, D., 2478
Roy, R. S., 2975
Rudorf, W., 2587, 2653, 2807
Rundfeldt, H., 2665
[Russell, W. A.], 2748
Russo, F., 2968
Ryan, F. J., 2476
Ryžei, I., 2610

Saccas, A., 2575
[Sadd, J.], 2836
Saenko, G. N., 2512
Šakurov, V. Z., 3085
Salmon, E. S., 2919
Salmon, S. C., 2579
Saltykovskiĭ, M. I., 2621
Sampath, S., [2539], 2743
Sánchez-Monge, E., 2386
[Santhanam, V.], 2538
Saprygina, E. S., 2621
Saraswathy Royan, 2517
[Sarma, A. K.], 2537
[Sattar, A.], 2563
[Saunders, A. R.], 2541
Saura, F., 2768
Sax, K., 2446
Saz, A. K., 2492
Sazanov, V. I., 2645
Schaal, L. A., 2822
Schaal, W., 2658
Scheffer, T. C., 3030
Schermerhorn, L. G., 3040
Schiemann, E., 2638
Schmidt, H., 3025
Schneider, E. O., 2674
Schnell, W., 2653
Schoth, H. A., 2781
Schreiber, J., 2765
Schrimpf, K., 2601
Schröck, O., 3014
Schultes, R. E., 2913
Schultz, E. S., 2824
Schwartz, D., 2893
Sears, E. R., 2594, 2597
Seitz, F. W., 3013

Selenius, H., 2571
Self, F. W., 2849
Sen, S. C., 2869
Serbin, S. S., 2879
Serenkov, G., 2609
[Serrano, H.], 2465
[Sethi, R. L.], 2538
Sevag, M. G., 2491
Shands, H. L., 2637
Sharp, C. C. T., 2943
Shay, J. R., 2961
Shebeski, L. H., 2722
Shekleton, M. C., 2670
Shepherd, K., 2997
Sibašvili, Z. G., 3002
Sieglinger, J. B., 2733
Sigle, K., 2817
Silva, M. Vianna e, 2737
Simmonds, N. W., 2997
Simonet, M., 2585
[Singh, H. B.], 2537
Skibnevskaja, N. N., 2820
Smiley, N. B., 2918
Smith, A. L., 2845
Smith, H. C., 2559
Smith, L., [2445], 2702
Snell, K., p. 633
Sokoljakaja, B. P., 2792
Söllner, R., 2456
Solovjeva, A. I., 3017
Sörgel, G., 3089
Sosa-Bourdouil, C., 2915
[Spence, J. R.], 2836
[Spencer, D. M.], 2529
Sprague, G. F., 2663
Stacy, S. V., 2848
Stahler, L. M., 2725
Stahmann, M. A., 3037
Stakman, E. C., 2504, [2563], 2574
Santini, L., 2565
Stanton, T. R., 2634
Stanton, W. R., 2815
[Stapleton, G. E.], 2410
Steele, T. E., 2848
Steeves, T. A., 2744
Steib, R. J., 2867
Stephens, J. C., 2732
[Stern, C.], 2445
Stern, K., 3014
Stevens, W. L., 2363
Stevenson, F. J., 2824
Stinson, F. A., 2901, 2905
Stoeckeler, J. H., 3029
Stoffels, E., 2570
[Storey, H. H.], 2541
Stout, A. B., 2384
Strand, L., 3007
[Subba Rao, K. S.], 2537
Subbotina, A. E., 2619
Subramaniam, M. K., 2517, [2538]
[Sukhatme, P. V.], 2538
Šuljga, M. S., 3081
Sumanov, E. Ja., 2616
Sun, E. M., 2847
Svensson, V., 3033
Swaminathan, M. S., 2810
[Swanson, C. P.], 2410
Syed Fashiuddin Ahmed, 2975

Tabidze, D. I., 3000
Takahashi, R., 2703–4, 2721
[Taskir Ahmad], 2563
Tatum, L. A., 2690
Távora, L. de, 2649
Taylor, H., 2450
Taylor, S., 2675
Tedin, O., 2798
Teghem, J., 2362
Ter-Avanesjan, D. V., 2603
Terentjeva, A. I., 2903
Ternovskiĭ, M. F., 2903
Therman, E., 2444
Thijn, G. A., 2813
Thomas, C. A., 2934
[Thomas, D. G.], 2836
[Thuljaram Rao, J.], 2539
[Timakov, V. D.], 2515
Timofeeva-Tjulina, M. T., 2607
Tippett, L. H. C., p. 624
Tirelli, M., 2565
Tischer, R. G., 3048
Tjugina, E. I., 3076
Toal, J. N., 2492
Tometorp, G., 3039
Toole, E. H., 3071
Toole, V. K., 3071
Torrisi, M., 2968
Toxopeus, H. J., 2527
Trentin, A., 2682
Tsai, K. H., 2746
Tucker, L., 2477
Tulasne, R., 2480
Turbin, N. V., 3056
Tyler, L. J., 2698

Ufer, M., 2932
Ustinova, E. I., 3930

Vaarama, A., 2992
Vaillant, A., 2736
Valleau, W. D., 2900
van der Knaap, W. P., 2906
[Van der Plank, J. E.], 2541
Van der Vaart, F. M., 3086
[Varma, G.], 2537
[Vasudeva, T. S.], 2537
Vega, J., 3005
Vendrely, C., 2430
Vendrely, R., 2430, 2480
[Venkatansrasinga Rao, M. B.], 2539
Vinogradova, E. I., 2635
Vinogradova, N. M., 2632
[Vishveshwara, S.], 2538
Voĭtčišina, O. N., 2606
von Wangenheim, K. H. F., 2460
von Wettstein, D., 2720
Vorster, P. W., 3034
Voureka, A., 2487

Waddington, C. H., 2420
Wall, A., 2628
Wallace, A. T., 2797
Walker, J. C., 3037
Walter, J. M., 3061
Walters, H. J., 3068
Wang, H., 2833
Webb, T. E., 2797
Weber, A., p. 634
Weber, C. R., 3078
Welch, J. E., 3070
Wellensiek, S. J., 2562
Webster, R. E., 3071
Westergaard, M., 2509
Whitaker, T. W., 3044
White, H. H., 2781
[Wickens, G. M.], 2836
Wickerham, L. J., 2521
[Wiebe, G. A.], 2697, 2708
Wiehe, P. O., 2873
Wiles, A. B., 2846
Williams, L. F., 3077
[Williams, R. O.], 2836
Wilsie, C. P., 2762
[Wilson, E. V. B.], 2528
Wilson, J. D., 3049
Wilson, K. B., 2369
Wilson, R. D., 3066
Winge, Ö., 2513, 2520
Wintrebert, P., 2418
Wiser, W. J., 2686–7, 2928
Wood, R. R., 2883
Woodworth, C. M., 2689
Wright, L. N., 2769
Wu, Y. S., 2723

Xabregas, J., 2936

Yamamoto, J., 2704
Yao, Y. T., 2741, 2745
Yarwood, C. E., 3069

Zanotti, L., 2971
Zavackaja, E. A., 2956
Zimmermann, K., 2782
[Zirkle, R. E.], 2410
Zorin, F. M., 2973
Zuluaga, P. A., 3003

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